

TA

552

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⌘B 26 759

YC 13554

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91

21  
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8100

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4.8

11.4  
5.1  
87.4

8541

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7700

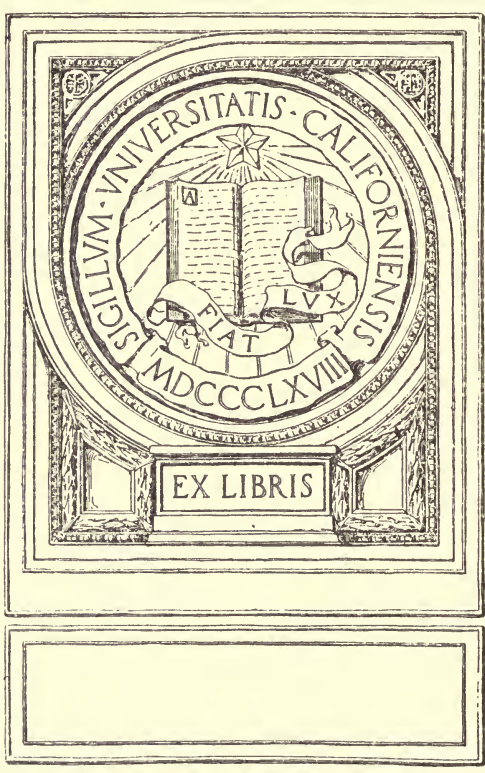
152

4.4

IN MEMORIAM

J. Henry Senger

6.

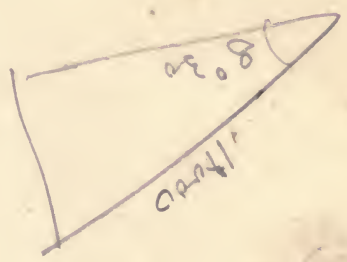


✓

902

$$\begin{array}{r}
 1776000 \\
 \times 148 \\
 \hline
 1320000 \\
 266000 \\
 148000 \\
 \hline
 2620000
 \end{array}$$

$$\frac{1776}{x} = \sin 80.30^\circ$$







Raymond, William Galt.

PAGES OF TABLES  
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TA 552  
R3

**IN MEMORIAM**

Prof. J. Henry Senger

## V. TABLES.

TABLE I.

CORRECTION TO ONE HUNDRED UNITS MEASURED ALONG THE SLOPES GIVEN.

UNITS RISE IN 100.	CORRESPONDING VERTICAL ANGLE.	CORRECTION.
1.02	0° 35'	0.005
2.01	1° 09'	0.020
3.03	1° 44'	0.046
4.02	2° 18'	0.081
5.01	2° 52'	0.125
6.00	3° 26'	0.179
7.00	4° 00'	0.244
8.02	4° 35'	0.320
9.01	5° 09'	0.404
10.01	5° 43'	0.497
20.01	11° 19'	1.617
30.00	16° 42'	4.218
40.00	21° 48'	7.151
50.00	26° 34'	10.559

TABLE II.<sup>1</sup>

CORRECTION COEFFICIENT FOR TEMPERATURE AND HYGROMETRIC CONDITIONS.

This correction is used when no hygrometric observations have been made. To the difference in altitude found in Table III. for the given barometer readings is added algebraically the product of that difference and the correction below given, according to the formula, Diff. Alt. = (Diff. by Table III.) (1 + c).

SUM O. T. <sup>2</sup>	CORR. COEFF. <sup>3</sup>	SUM O. T.	CORR. COEFF.	SUM O. T.	CORR. COEFF.
0°	0.1024	70°	0.0273	140°	0.0471
10	0.0915	80	0.0166	150	0.0575
20	0.0806	90	0.0058	160	0.0677
30	0.0698	100	0.0049	170	0.0779
40	0.0592	110	0.0156	180	0.0879
50	0.0486	120	0.0262		
60	0.0380	130	0.0368		

<sup>1</sup> Computed from Tables I. and IV., Appendix 10, "U. S. Coast Survey Report" for 1881.

<sup>2</sup> Sum of Observed Temperatures.

<sup>3</sup> Correction Coefficient.

TABLE III.<sup>1</sup>

## BAROMETRIC ELEVATIONS.

Giving altitudes above arbitrary sea level (barometer reading 30 inches) for various barometer readings  $B$ .

To determine difference of elevation of two points having barometer readings  $B$  and  $B_1$ , take from the table the altitudes corresponding to  $B$  and  $B_1$ , and correct *their difference* by Table II. The corrected difference is the quantity required.

$B$ .	$A$ .	DIFF. FOR .01.	$B$ .	$A$ .	DIFF. FOR .01.	$B$ .	$A$ .	DIFF. FOR .01.
<i>Inches.</i>	<i>Feet.</i>	<i>Feet.</i>	<i>Inches.</i>	<i>Feet.</i>	<i>Feet.</i>	<i>Inches.</i>	<i>Feet.</i>	<i>Feet.</i>
11.0	27,336	-24.6	14.0	20,765	-19.5	17.0	15,476	-16.0
11.1	27,090	24.4	14.1	20,570	19.3	17.1	15,316	15.9
11.2	26,846	24.2	14.2	20,377	19.1	17.2	15,157	15.8
11.3	26,604	24.0	14.3	20,186	18.9	17.3	14,999	15.7
11.4	26,364	23.8	14.4	19,997	18.8	17.4	14,842	15.6
11.5	26,126	23.6	14.5	19,809	18.6	17.5	14,686	15.5
11.6	25,890	23.4	14.6	19,623	18.6	17.6	14,531	15.4
11.7	25,656	23.2	14.7	19,437	18.5	17.7	14,377	15.4
11.8	25,424	23.0	14.8	19,252	18.4	17.8	14,223	15.3
11.9	25,194	22.8	14.9	19,068	18.2	17.9	14,070	15.2
12.0	24,966	22.6	15.0	18,886	18.1	18.0	13,918	15.1
12.1	24,740	22.4	15.1	18,705	18.0	18.1	13,767	15.0
12.2	24,516	22.2	15.2	18,525	17.9	18.2	13,617	14.9
12.3	24,294	22.1	15.3	18,346	17.8	18.3	13,468	14.9
12.4	24,073	21.9	15.4	18,168	17.6	18.4	13,319	14.7
12.5	23,854	21.7	15.5	17,992	17.5	18.5	13,172	14.7
12.6	23,637	21.6	15.6	17,817	17.4	18.6	13,025	14.6
12.7	23,421	21.4	15.7	17,643	17.3	18.7	12,879	14.6
12.8	23,207	21.2	15.8	17,470	17.2	18.8	12,733	14.4
12.9	22,995	21.0	15.9	17,298	17.1	18.9	12,589	14.4
13.0	22,785	20.9	16.0	17,127	16.9	19.0	12,445	14.3
13.1	22,576	20.8	16.1	16,958	16.9	19.1	12,302	14.2
13.2	22,368	20.6	16.2	16,789	16.8	19.2	12,160	14.2
13.3	22,162	20.4	16.3	16,621	16.7	19.3	12,018	14.1
13.4	21,958	20.1	16.4	16,454	16.6	19.4	11,877	14.0
13.5	21,757	20.0	16.5	16,288	16.4	19.5	11,737	13.9
13.6	21,557	19.9	16.6	16,124	16.3	19.6	11,598	13.9
13.7	21,358	19.8	16.7	15,961	16.3	19.7	11,459	13.8
13.8	21,160	19.8	16.8	15,798	16.2	19.8	11,321	13.7
13.9	20,962	-19.7	16.9	15,636	-16.0	19.9	11,184	-13.7
14.0	20,765		17.0	15,476		20.0	11,047	

<sup>1</sup> Taken from Appendix 10, "U. S. Coast and Geodetic Survey Report" for 1881.

TABLE III. (continued).

B.	A.	DIFF. FOR .01.	B.	A.	DIFF. FOR .01.	B.	A.	DIFF. FOR .01.
<i>Inches.</i>	<i>Feet.</i>	<i>Feet.</i>	<i>Inches.</i>	<i>Feet.</i>	<i>Feet.</i>	<i>Inches.</i>	<i>Feet.</i>	<i>Feet.</i>
20.0	11,047	-13.6	23.7	6,423	-11.5	27.4	2,470	-9.9
20.1	10,911	13.5	23.8	6,308	11.4	27.5	2,371	9.9
20.2	10,776	13.4	23.9	6,194	11.4	27.6	2,272	9.9
20.3	10,642	13.4	24.0	6,080	11.3	27.7	2,173	9.8
20.4	10,508	13.3	24.1	5,967	11.3	27.8	2,075	9.8
20.5	10,375	13.3	24.2	5,854	11.3	27.9	1,977	9.7
20.6	10,242	13.2	24.3	5,741	11.2	28.0	1,880	9.7
20.7	10,110	13.1	24.4	5,629	11.1	28.1	1,783	9.7
20.8	9,979	13.1	24.5	5,518	11.1	28.2	1,686	9.7
20.9	9,848	13.0	24.6	5,407	11.1	28.3	1,589	9.6
21.0	9,718	12.9	24.7	5,296	11.0	28.4	1,493	9.6
21.1	9,589	12.9	24.8	5,186	10.9	28.5	1,397	9.5
21.2	9,460	12.8	24.9	5,077	10.9	28.6	1,302	9.5
21.3	9,332	12.8	25.0	4,968	10.9	28.7	1,207	9.5
21.4	9,204	12.7	25.1	4,859	10.8	28.8	1,112	9.4
21.5	9,077	12.6	25.2	4,751	10.8	28.9	1,018	9.4
21.6	8,951	12.6	25.3	4,643	10.8	29.0	924	9.4
21.7	8,825	12.5	25.4	4,535	10.7	29.1	830	9.4
21.8	8,700	12.5	25.5	4,428	10.7	29.2	736	9.3
21.9	8,575	12.4	25.6	4,321	10.6	29.3	643	9.3
22.0	8,451	12.4	25.7	4,215	10.6	29.4	550	9.2
22.1	8,327	12.3	25.8	4,109	10.5	29.5	458	9.2
22.2	8,204	12.2	25.9	4,004	10.5	29.6	366	9.2
22.3	8,082	12.2	26.0	3,899	10.5	29.7	274	9.2
22.4	7,960	12.2	26.1	3,794	10.4	29.8	182	9.1
22.5	7,838	12.1	26.2	3,690	10.4	29.9	91	9.1
22.6	7,717	12.0	26.3	3,586	10.3	30.0	00	9.1
22.7	7,597	12.0	26.4	3,483	10.3	30.1	-91	9.0
22.8	7,477	11.9	26.5	3,380	10.3	30.2	181	9.0
22.9	7,358	11.9	26.6	3,277	10.2	30.3	271	9.0
23.0	7,239	11.8	26.7	3,175	10.2	30.4	361	9.0
23.1	7,121	11.7	26.8	3,073	10.1	30.5	451	8.9
23.2	7,004	11.7	26.9	2,972	10.1	30.6	540	8.9
23.3	6,887	11.7	27.0	2,871	10.1	30.7	629	8.8
23.4	6,770	11.6	27.1	2,770	10.0	30.8	717	8.8
23.5	6,654	11.6	27.2	2,670	10.0	30.9	805	-8.8
23.6	6,538	-11.5	27.3	2,570	-10.0	31.0	-893	
23.7	6,423		27.4	2,470				

TABLE IV.

POLAR DISTANCE OF POLARIS. For January 1 of years named.

1894	1897	1900	1903	1906	1909	1912	1915	1918	1921
1° 15.43'	1° 14.50'	1° 13.55'	1° 12.62'	1° 11.68'	1° 10.75'	1° 09.82'	1° 08.88'	1° 07.97'	1° 07.03'

$$\text{Sin of azimuth at elongation} = \frac{\text{sin polar distance}}{\text{cosine latitude}}$$

Latitude = altitude of Polaris at culmination  $\pm$  polar distance — refraction correction given below.

LATITUDE.	CORRECTION, MINUTES.	LATITUDE.	CORRECTION, MINUTES.
20°	2.60	50°	0.80
30°	1.65	60°	0.55
40°	1.13		

TABLE V.<sup>1</sup>

AMOUNT AND VARIATION OF THE MAGNETIC NEEDLE FROM ITS  
MEAN DAILY POSITION.

The letters E and W indicate which side of the mean position the needle points.

SEASON AND POSITION IN LATITUDE.	LOCAL MEAN TIME; MORNING HOURS.						
	6 <sup>h</sup>	7 <sup>h</sup>	8 <sup>h</sup>	9 <sup>h</sup>	10 <sup>h</sup>	11 <sup>h</sup>	12 <sup>h</sup>
December, January, February:	/	/	/	/	/	/	/
Latitude 37° to 49° . . . . .	0.7 E	1.1 E	1.9 E	2.2 E	1.5 E	0.1 W	1.8 W
Latitude 25° to 37° . . . . .	0.1 W	0.1 E	1.0 E	2.0 E	2.2 E	1.1 E	0.5 W
March, April, May:							
Latitude 37° to 49° . . . . .	2.6 E	3.8 E	4.4 E	3.5 E	1.2 E	1.6 E	3.8 W
Latitude 25° to 37° . . . . .	1.6 E	2.8 E	3.3 E	2.6 E	1.1 E	0.6 W	1.9 W
June, July, August:							
Latitude 37° to 49° . . . . .	4.0 E	5.6 E	5.7 E	4.5 E	1.7 E	1.6 E	4.1 W
Latitude 25° to 37° . . . . .	2.4 E	4.0 E	4.2 E	2.9 E	0.5 E	1.6 W	2.8 W
September, October, November:							
Latitude 37° to 49° . . . . .	1.8 E	2.6 E	3.1 E	2.5 E	1.0 E	1.5 E	3.3 W
Latitude 25° to 37° . . . . .	0.9 E	2.1 E	2.6 E	2.1 E	0.6 E	0.9 W	2.1 W

SEASON AND POSITION IN LATITUDE.	LOCAL MEAN TIME; AFTERNOON HOURS.						
	0 <sup>h</sup>	1 <sup>h</sup>	2 <sup>h</sup>	3 <sup>h</sup>	4 <sup>h</sup>	5 <sup>h</sup>	6 <sup>h</sup>
December, January, February:	/	/	/	/	/	/	/
Latitude 37° to 49° . . . . .	1.8 W	2.9 W	2.8 W	2.1 W	1.3 W	0.7 W	0.2 W
Latitude 25° to 37° . . . . .	0.5 W	1.5 W	1.8 W	1.6 W	1.0 W	0.4 W	0.1 W
March, April, May:							
Latitude 37° to 49° . . . . .	3.8 W	4.8 W	4.6 W	3.8 W	2.5 W	1.4 W	0.7 W
Latitude 25° to 37° . . . . .	1.9 W	2.6 W	2.8 W	2.4 W	1.6 W	0.9 W	0.5 W
June, July, August:							
Latitude 37° to 49° . . . . .	4.1 W	5.6 W	5.6 W	4.6 W	3.0 W	1.4 W	0.6 W
Latitude 25° to 37° . . . . .	2.8 W	3.2 W	3.1 W	2.4 W	1.5 W	0.8 W	0.4 W
September, October, November:							
Latitude 37° to 49° . . . . .	3.3 W	4.0 W	3.4 W	2.3 W	1.2 W	0.6 W	0.1 W
Latitude 25° to 37° . . . . .	2.1 W	2.3 W	1.9 W	1.2 W	0.7 W	0.4 W	0.2 W

<sup>1</sup> From "Manual of Instructions" issued by the U. S. Land Office to Surveyors General.



$$\begin{array}{r}
 12.62 \\
 38^{\circ} 21.38 \\
 \hline
 1.21 \\
 38^{\circ} 20' N
 \end{array}$$

# TABLES.

$$\begin{array}{r}
 4.2 \\
 8.4 \\
 \hline
 1.21
 \end{array}$$

365

TABLE VI.<sup>1</sup>

APPROXIMATE LOCAL MEAN TIMES (COUNTING FROM NOON 24 HOURS)  
OF THE ELONGATIONS AND CULMINATIONS OF POLARIS IN THE YEAR  
1897 FOR LATITUDE 40° N.; LONGITUDE 6<sup>h</sup> W. FROM GREENWICH.

DATE.	EAST ELONGATION.		WEST ELONGATION.		UPPER CULMINATION.		LOWER CULMINATION.	
	h.	m.	h.	m.				
Jan. 1	0	38.2	12	27.8	6	33.6	18	31.6
15	23	39.0	11	32.5	5	38.6	17	36.3
Feb. 1	22	31.8	10	25.4	4	31.2	16	29.2
15	21	36.6	9	30.2	3	35.9	15	33.9
Mar. 1	20	41.4	8	34.9	2	40.7	14	38.7
15	19	46.3	7	39.8	1	45.7	13	43.7
Apr. 1	18	39.3	6	32.8	0	38.6	12	36.7
15	17	44.3	5	37.8	23	39.7	11	41.7
May 1	16	41.5	4	35.0	22	36.8	10	38.8
15	15	46.6	3	40.1	21	41.9	9	43.9
June 1	14	39.9	2	33.4	20	35.3	8	37.3
15	13	45.0	1	38.5	19	40.4	7	42.4
July 1	12	42.4	0	35.9	18	37.8	6	39.8
15	11	47.5	23	37.1	17	42.9	5	44.9
Aug. 1	10	41.0	22	30.6	16	36.4	4	38.4
15	9	46.1	21	35.7	15	41.5	3	43.5
Sept. 1	8	39.5	20	29.1	14	34.9	2	36.9
15	7	44.6	19	34.2	13	40.0	1	42.0
Oct. 1	6	41.8	18	31.4	12	37.2	0	39.2
15	5	46.8	17	36.4	11	42.2	23	40.3
Nov. 1	4	40.0	16	29.6	10	35.4	22	33.4
15	3	44.8	15	34.4	9	40.2	21	38.2
Dec. 1	2	41.8	14	31.4	8	37.2	20	35.2
15	1	46.5	13	36.1	7	41.9	19	39.9

To refer to any calendar day other than the first and fifteenth of each month, subtract 3.94<sup>m</sup> for every day between it and the preceding tabular day, or add 3.94<sup>m</sup> for every day between it and the succeeding tabular day.

To refer the tabular times to any year subsequent to the year 1897, add 0.25<sup>m</sup> (nearly) for every additional year (after 1900, 0.2<sup>m</sup>).

Also,  
For the second year after a leap year, add, 0.9<sup>m</sup>.  
For the third year after a leap year, add, 1.7<sup>m</sup>.  
For leap year *before* March 1, add, 2.6<sup>m</sup>.  
For leap year *on* and *after* March 1, subtract, 1.2<sup>m</sup>.

For the first year after a leap year the table is correct, except for the regular annual change.

To refer the tabular times to other longitudes than six hours, add when east, and subtract when west of six hours, 0.16<sup>m</sup> for each hour.

To refer to any other than the tabular latitude between the limits of 25° and 50° north, *add* to the time of west elongation 0.13<sup>m</sup> for every degree south of latitude 40°, and *subtract* from the time of west elongation 0.18<sup>m</sup> for every degree north of 40°. Reverse these signs for corrections to the times of east elongation. For latitudes as high as 60°, diminish the times of *west* elongation and increase the times of *east* elongation by 0.23<sup>m</sup> for every degree north of latitude 40°.

<sup>1</sup> Computed from information contained in the "Manual of Instructions" issued by the General Land Office. The information was furnished by the U. S. Coast and Geodetic Survey.



TABLE VII.<sup>1</sup>

REFRACTION CORRECTIONS TO DECLINATION OF THE SUN.

The hour angle is the time either side of noon.

LATITUDE.	HOUR ANGLE.	DECLINATIONS.								
		+20°	+15°	+10°	+5°	0°	-5°	-10°	-15°	-20°
° ' h.		' "	' "	' "	' "	' "	' "	' "	' "	' "
25 00	0	0 05	0 10	0 15	0 21	0 27	0 33	0 40	0 48	0 57
	2	0 08	0 14	0 19	0 25	0 31	0 38	0 46	0 54	1 05
	3	0 12	0 18	0 24	0 30	0 37	0 44	0 53	1 04	1 18
	4	0 23	0 29	0 35	0 45	0 53	1 03	1 16	1 31	1 52
	5	0 49	0 59	1 10	1 24	1 52	2 07	2 44	3 46	5 43
27 30	0	0 08	0 13	0 18	0 24	0 30	0 36	0 44	0 52	1 02
	2	0 11	0 16	0 22	0 28	0 34	0 41	0 49	1 00	1 10
	3	0 17	0 22	0 28	0 35	0 42	0 50	1 00	1 11	1 26
	4	0 28	0 35	0 42	0 50	1 00	1 11	1 26	1 43	2 09
	5	0 54	1 05	1 18	1 34	1 54	2 24	3 11	4 38	8 15
30 00	0	0 10	0 15	0 21	0 27	0 33	0 40	0 48	0 57	1 08
	2	0 14	0 19	0 25	0 31	0 38	0 46	0 54	1 05	1 18
	3	0 20	0 26	0 32	0 39	0 47	0 55	1 06	1 19	1 36
	4	0 32	0 39	0 46	0 52	1 06	1 19	1 35	1 57	2 29
	5	1 00	1 10	1 24	1 52	2 07	2 44	3 46	5 43	13 06
32 30	0	0 13	0 18	0 24	0 30	0 36	0 44	0 52	1 02	1 14
	2	0 17	0 22	0 28	0 35	0 42	0 50	1 00	1 11	1 26
	3	0 23	0 29	0 35	0 43	0 51	1 01	1 13	1 28	1 47
	4	0 35	0 43	0 51	1 01	1 13	1 27	1 46	2 13	2 54
	5	1 03	1 15	1 31	1 53	2 20	3 05	4 25	7 36	—
35 00	0	0 15	0 21	0 27	0 33	0 40	0 48	0 57	1 08	1 21
	2	0 20	0 25	0 32	0 38	0 46	0 55	1 05	1 18	1 35
	3	0 26	0 33	0 39	0 47	0 56	1 07	1 21	1 38	2 00
	4	0 39	0 47	0 56	1 07	1 20	1 36	1 59	2 32	3 25
	5	1 07	1 20	1 38	2 00	2 34	3 29	5 14	10 16	—

<sup>1</sup> Computed from formula

$$C = 57'' \cot (\delta + N),$$

in which  $\delta$  is the declination, plus when north, and minus when south; and  $N$  an auxiliary angle found by

$$\tan N = \cot \phi \cos t,$$

in which  $\phi$  is the latitude of the place, and  $t$  the angle between the meridian of the place and the meridian through the sun at the given time, — called the "hour angle." The formulæ are from Chauvenet's "Spherical and Practical Astronomy," vol. I., p. 171. The table was computed by Mr. Edward W. Arms, C.E., for Messrs. W. & L. E. Gurley, of Troy, N.Y., and is here used by their permission.

TABLE VII. (continued).

LATI- TUDE.	HOUR ANGLE.	DECLINATIONS.									
		+20°	+15°	+10°	+5°	0°	-5°	-10°	-15°	-20°	
° ' h.	' "	' "	' "	' "	' "	' "	' "	' "	' "	' "	
37 30	0	0 18	0 24	0 30	0 36	0 44	0 52	1 02	1 14	1 29	
	2	0 22	0 28	0 35	0 42	0 50	1 00	1 12	1 26	1 45	
	3	0 29	0 36	0 43	0 52	1 02	1 14	1 29	1 49	2 16	
	4	0 43	0 51	1 01	1 13	1 27	1 49	2 14	2 54	4 05	
	5	1 11	1 26	1 44	2 10	2 49	3 55	6 15	14 58	—	
40 00	0	0 21	0 27	0 33	0 40	0 48	0 57	1 08	1 21	1 03	
	2	0 25	0 32	0 39	0 46	0 52	1 06	1 19	1 35	1 57	
	3	0 33	0 40	0 48	0 57	1 08	1 21	1 38	2 02	2 36	
	4	0 47	0 55	1 06	1 19	1 36	1 58	2 30	3 21	4 59	
	5	1 15	1 31	1 51	2 20	3 05	4 25	7 34	25 18	—	
42 30	0	0 24	0 30	0 36	0 44	0 52	1 02	1 14	1 29	1 49	
	2	0 28	0 35	0 39	0 50	1 00	1 12	1 26	1 45	2 11	
	3	0 36	0 43	0 52	1 02	1 13	1 29	1 49	2 17	2 59	
	4	0 50	1 00	1 11	1 26	1 44	2 10	2 49	3 55	6 16	
	5	1 16	1 36	1 58	2 30	3 22	5 00	9 24	—	—	
45 00	0	0 27	0 33	0 40	0 48	0 57	1 08	1 21	1 39	2 02	
	2	0 32	0 39	0 46	0 52	1 06	1 19	1 35	1 57	2 29	
	3	0 40	0 47	0 56	1 07	1 21	1 38	2 00	2 34	3 29	
	4	0 54	1 04	1 16	1 33	1 54	2 24	3 11	4 38	8 15	
	5	1 23	1 41	2 05	2 41	3 40	5 40	12 02	—	—	
47 30	0	0 30	0 36	0 44	0 52	1 02	1 14	1 29	1 49	2 18	
	2	0 35	0 42	0 50	1 00	1 12	1 26	1 45	2 01	2 51	
	3	0 43	0 51	1 01	1 13	1 28	1 47	2 15	2 56	4 08	
	4	0 56	1 09	1 23	1 40	2 05	2 40	3 39	5 37	11 18	
	5	1 27	1 46	2 12	2 52	4 01	6 30	16 19	—	—	
50 00	0	0 33	0 40	0 48	0 57	1 08	1 21	1 39	2 02	2 36	
	2	0 38	0 46	0 55	1 06	1 18	1 35	1 57	2 28	3 19	
	3	0 47	0 56	1 06	1 19	1 36	2 29	2 31	3 23	5 02	
	4	1 02	1 14	1 29	1 48	2 16	2 58	4 18	6 59	19 47	
	5	1 30	1 51	2 19	3 04	4 22	7 28	24 10	—	—	
52 30	0	0 36	0 44	0 52	1 02	1 14	1 29	1 49	2 18	3 05	
	2	0 43	0 50	0 59	1 11	1 26	1 42	2 23	2 49	3 55	
	3	0 50	1 00	1 11	1 26	1 45	2 11	2 51	2 58	6 22	
	4	1 05	1 18	1 35	2 10	2 28	3 19	4 53	8 42	—	
	5	1 34	1 56	2 27	3 16	4 47	8 52	—	—	—	
55 00	0	0 40	0 48	0 57	1 08	1 21	1 39	2 02	2 36	3 33	
	2	0 46	0 55	1 05	1 18	1 34	1 56	2 30	3 15	4 47	
	3	0 55	1 06	1 19	1 35	1 58	2 30	3 21	4 58	9 19	
	4	1 10	1 23	1 42	2 06	2 43	3 44	5 49	12 41	—	
	5	1 37	2 01	2 34	3 28	5 15	10 18	—	—	—	

TABLE VIII.<sup>1</sup>

## MAGNETIC DECLINATION.

Formulas giving approximately the magnetic declination at the places named and for any time within the limits of the period of observation. The places are divided into three groups, as follows:

GROUP I. — Magnetic stations on the eastern coast of the United States and inclusive of the region of the Appalachian range, with some additional stations in Newfoundland and other foreign localities.

GROUP II. — Magnetic stations mainly in the central part of the United States between the Appalachian and Rocky Mountain ranges, with additions in British North America, Canada, the West Indies, and Central America.

GROUP III. — Magnetic stations on the Pacific coast and Rocky Mountain region; also in Mexico and Alaska and in some foreign countries.

D stands for declination, + indicating west, and — east declination; *m* stands for *t* — 1850.0 or for the difference in time, expressed in years and fraction of a year, for any time *t* and the middle of the century; a \* indicates uncertainty.

No.	NAME OF STATION AND STATE.	LATI- TUDE.	WEST LONGI- TUDE.	THE MAGNETIC DECLINATION EXPRESSED AS A FUNCTION OF TIME.
GROUP I.				
1	Saint Johns, New- foundland.	47 34.4	52 41.9	$D = +21.94 + 8.89 \sin(1.05 m + 63.4)^*$
2	Quebec, Canada.	46 48.4	71 14.5	$D = +14.66 + 3.03 \sin(1.4 m + 4.6)$ + $0.61 \sin(4.0 m + 0.3)$
3	Charlottetown, P.E.I.	46 14	63 27	$D = +15.95 + 7.78 \sin(1.2 m + 49.8)$
4	Montreal, Canada.	45 30.5	73 34.6	$D = +11.88 + 4.17 \sin(1.5 m - 18.5)$ + $0.36 \sin(4.9 m + 19)$
5	Eastport, Me.	44 54.4	66 59.2	$D = +15.18 + 3.79 \sin(1.25 m + 31.1)^*$
6	Bangor, Me.	44 48.2	68 46.9	$D = +13.86 + 3.55 \sin(1.30 m + 8.6)$
7	Halifax, Nova Scotia.	44 39.6	63 35.3	$D = +16.18 + 4.53 \sin(1.0 m + 46.1)^*$
8	Burlington, Vt.	44 28.5	73 12.0	$D = +10.81 + 3.65 \sin(1.30 m - 20.5)$ + $0.18 \sin(7.0 m + 132)$
9	Hanover, N. H.	43 42.3	72 17.1	$D = + 9.80 + 4.02 \sin(1.4 m - 14.1)^*$
10	Portland, Me.	43 38.8	70 16.6	$D = +11.40 + 3.28 \sin(1.30 m + 2.7)$
11	Rutland, Vt.	43 36.5	72 55.5	$D = +10.03 + 3.82 \sin(1.5 m - 24.3)$
12	Portsmouth, N. H.	43 04.3	70 42.5	$D = +10.71 + 3.36 \sin(1.44 m - 7.4)$
13	Chesterfield, N. H.	42 53.5	72 24	$D = + 9.60 + 3.84 \sin(1.35 m - 16.1)^*$
14	Newburyport, Mass.	42 48.9	70 49.2	$D = +10.07 + 3.02 \sin(1.35 m - 1.0)$
15	Williamstown, Mass.	42 42.8	73 13.4	$D = + 8.84 + 3.13 \sin(1.4 m - 14.0)^*$
16	Albany, N. Y.	42 39.2	73 45.8	$D = + 8.17 + 3.02 \sin(1.44 m - 8.3)$
17	Salem, Mass.	42 31.9	70 52.5	$D = + 9.98 + 3.85 \sin(1.4 m - 5.1)^*$
18	Oxford, N. Y.	42 26.5	75 40.5	$D = + 6.19 + 3.24 \sin(1.35 m - 18.9)$
19	Cambridge, Mass.	42 22.9	71 07.7	$D = + 9.54 + 2.69 \sin(1.30 m + 7.0)$ + $0.18 \sin(3.2 m + 44)$
20	Boston, Mass.	42 21.5	71 03.9	$D = + 9.48 + 2.94 \sin(1.3 m + 3.7)$
21	Provincetown, Mass.	42 03.1	70 11.3	$D = + 9.67 + 3.04 \sin(1.3 m + 11.0)^*$
22	Providence, R. I.	41 50.2	71 23.8	$D = + 9.10 + 2.99 \sin(1.45 m - 3.4)$ + $0.26 \sin( 7 m + 84)$
23	Hartford, Conn.	41 45.9	72 40.4	$D = + 8.06 + 2.90 \sin(1.25 m - 26.4)$
24	New Haven, Conn.	41 18.5	72 55.7	$D = + 7.78 + 3.11 \sin(1.40 m - 22.1)$
25	Nantucket, Mass.	41 17.0	70 06.0	$D = + 8.61 + 2.83 \sin(1.35 m + 19.7)$
26	Cold Spring Harbor, Long Island, N. Y.	40 52	73 28	$D = + 7.19 + 2.52 \sin(1.35 m - 11.4)$
27	New York City, N. Y.	40 42.7	74 00.4	$D = + 7.04 + 2.77 \sin(1.30 m - 18.1)$ + $0.14 \sin(6.3 m + 64)$

<sup>1</sup> From Appendix 7, "U. S. Coast and Geodetic Survey Report" for 1888.

No.	NAME OF STATION AND STATE.	LATI- TUDE.	WEST LONGI- TUDE.	THE MAGNETIC DECLINATION EXPRESSED AS A FUNCTION OF TIME.
		° ' "	° ' "	° ° °
28	Bethlehem, Pa.	40 36.4	75 22.9	$D = + 5.40 + 3.13 \sin(1.55 m - 38.3)$
29	Huntingdon, Pa.	40 31	78 02	$D = + 3.76 + 2.93 \sin(1.48 m - 35.2)$
30	New Brunswick, N.J.	40 29.9	74 26.8	$D = + 5.11 + 2.94 \sin(1.30 m + 4.2)$
31	Jamesburg, N. J.	40 21	74 27	$D = + 6.03 + 2.94 \sin(1.40 m - 22.4)$
32	Harrisburg, Pa.	40 15.9	76 52.9	$D = + 2.93 + 2.98 \sin(1.50 m + 0.2)$
33	Hatboro, Pa.	40 12	75 07	$D = + 5.17 + 3.16 \sin(1.54 m - 16.7)$ $+ 0.22 \sin(4.1 m + 157)$
34	Philadelphia, Pa.	39 56.9	75 09.0	$D = + 5.36 + 3.17 \sin(1.50 m - 26.1)$ $+ 0.19 \sin(4.0 m + 146)$
35	Chambersburg, Pa.	39 55	77 40	$D = + 2.79 + 3.10 \sin(1.55 m - 30.6)$ $+ 0.20 \sin(4.6 m + 124)$
36	Baltimore, Md.	39 17.8	76 37.0	$D = + 3.20 + 2.57 \sin(1.45 m - 21.2)$
37	Washington, D. C.	38 53.3	77 00.6	$D = + 2.73 + 2.57 \sin(1.45 m - 21.6)$ $+ 0.14 \sin(12 m + 27)$
38	Cape Henlopen, Del.	38 46.7	75 05.0	$D = + 4.01 + 3.22 \sin(1.35 m - 25.2)$
39	Williamsburg, Va.	37 16.2	76 42.4	$D = + 2.33 + 2.56 \sin(1.5 m - 38.1)$
40	Cape Henry, Va.	36 55.6	76 00.4	$D = + 2.42 + 2.25 \sin(1.47 m - 30.6)$
41	Newbern, N. C.	35 06	77 02	$D = + 0.63 + 2.56 \sin(1.45 m - 18.2)^*$
42	Milledgeville, Ga.	33 04.2	83 12	$D = - 3.10 + 2.53 \sin(1.40 m - 61.9)^*$
43	Charleston, S. C.	32 46.6	79 55.8	$D = - 1.82 + 2.75 \sin(1.40 m - 12.1)^*$
44	Savannah, Ga.	32 04.9	81 05.5	$D = - 2.13 + 2.55 \sin(1.40 m - 40.5)^*$
45	Paris, France.	48 50.2	2 20.2E	$D = + 6^{\circ}.479 + 16^{\circ}.002 \sin(0.765 m + 118^{\circ}.46'.5 + [0.85 - 0.35 \sin(0.69 n)] \sin[(4.04 + 0.0054 n + .000035 n^2)n]$
46	St. George's, Ber- muda	32 23	64 42	$D = + 6.95 + 0.0145 m + 0.00056 m^2^*$
47	Rio de Janeiro, Brazil	-22 54.8	43 09.5	$D = + 2.19 + 9.91 \sin(0.80 m - 10.4)^*$
GROUP II.				
1	York Factory, Brit- ish North America	56 59.9	92 26	$D = + 7.34 + 16.03 \sin(1.10 m - 97.9)$
2	Fort Albany, British North America.	52 22	82 38	$D = + 15.78 + 6.95 \sin(1.20 m - 99.6)^*$
3	{ Duluth, Minn., and Superior City, Wis.	46 45.5	92 04.5 }	$D = - 7.70 + 2.41 \sin(1.4 m - 120.0)^*$
4	Sault Ste. Marie, Mich.	46 39.9	92 04.2 }	
5	Pierrepont Manor, N. Y.	46 29.9	84 20.1	$D = + 1.54 + 2.70 \sin(1.45 m - 58.5)$
6	Toronto, Canada.	43 44.5	76 03.0	$D = + 5.95 + 3.78 \sin(1.4 m - 22.2)$
		43 39.4	79 23.5	$D = + 3.60 + 2.82 \sin(1.4 m - 44.7)$ $+ 0.09 \sin(9.3 m + 136)$ $+ 0.08 \sin(19 m + 247)$
7	Grand Haven, Mich.	43 05.2	86 12.6	$D = - 4.95 + 0.0380 m + 0.00120 m^2$
8	Milwaukee, Wis.	43 02.5	87 54.2	$D = - 4.12 + 3.60 \sin(1.45 m - 64.5)^*$
9	Buffalo, N. Y.	42 52.8	78 53.5	$D = + 3.66 + 3.47 \sin(1.4 m - 27.8)$
10	Detroit, Mich.	42 20.0	83 03.0	$D = - 0.97 + 2.21 \sin(1.5 m - 15.3)$
11	Ypsilanti, Mich.	42 14	83 38	$D = - 1.20 + 3.40 \sin(1.40 m - 4.1)$
12	Erie, Pa.	42 07.8	80 05.4	$D = + 2.17 + 2.69 \sin(1.5 m - 27.3)$
13	Chicago, Ill.	41 50.0	87 36.8	$D = - 3.77 + 2.48 \sin(1.45 m - 62.5)$
14	Michigan City, Ind.	41 43.4	86 54.4	$D = - 3.23 + 2.42 \sin(1.4 m - 48.0)$
15	Cleveland, O.	41 30.4	81 41.5	$D = + 0.47 + 2.39 \sin(1.30 m - 14.8)$
16	Omaha, Neb.	41 15.7	95 56.5	$D = - 9.30 + 3.34 \sin(1.30 m - 54.7)$
17	Beaver, Pa.	40 44	80 20	$D = + 1.41 + 2.72 \sin(1.40 m - 39.6)$



No.	NAME OF STATION AND STATE.	LATI- TUDE.	WEST LONGI- TUDE.	THE MAGNETIC DECLINATION EXPRESSED AS A FUNCTION OF TIME.	
				°	°
18	Pittsburg, Pa.	40 27.6	80 00.8	D = + 1.85 +	2.45 sin(1.45 m - 28.4)
19	Denver, Col.	39 45.3	104 59.5	D = - 15.30 +	0.011 m + 0.0005 m <sup>2</sup>
20	Marietta, O.	39 25	81 28	D = + 0.02 +	2.89 sin(1.4 m - 40.5)
21	Athens, O.	39 19	82 02	D = - 1.51 +	2.63 sin(1.4 m - 24.7)
22	Cincinnati, O.	39 08.4	84 25.3	D = - 2.59 +	2.43 sin(1.42 m - 37.9)
23	Saint Louis, Mo.	38 38.0	90 12.2	D = - 5.91 +	3.00 sin(1.40 m - 51.1)*
24	Nashville, Tenn.	36 08.9	86 48.2	D = - 3.57 +	3.33 sin(1.35 m - 68.5)*
25	Florence, Ala.	34 47.2	87 41.5	D = - 4.25 +	2.33 sin(1.3 m - 52.8)
26	Mobile, Ala.	30 41.4	88 02.5	D = - 4.38 +	2.69 sin(1.45 m - 76.4)
—	Pensacola, Fla.	30 20.8	87 18.3	D = - 4.40 +	3.16 sin(1.4 m - 59.4)
27	New Orleans, La.	29 57.2	90 03.9	D = - 5.20 +	2.98 sin(1.40 m - 69.8)
28	San Antonio, Tex.	29 25.4	98 29.3	D = - 7.40 +	2.88 sin(1.35 m - 81.8)*
29	Key West, Fla.	24 33.5	81 48.5	D = - 4.31 +	2.86 sin(1.30 m - 23.9)
30	Havana, Cuba.	23 09.3	82 21.5	D = - 4.25 +	2.74 sin(1.25 m - 23.3)*
31	Kingston, Port Royal, Jamaica.	17 55.9	76 50.6	D = - 3.81 +	2.39 sin(1.10 m - 10.6)
32	Barbados, Caribbee Islands.	13 05.7	59 37.3	D = - 1.38 +	2.84 sin(1.10 m + 09.4)
33	Panama, Colombia.	8 57.1	79 32.2	D = - 5.66 +	2.22 sin(1.10 m - 27.8)
GROUP III.					
1	Acapulco, Mexico.	16 50.5	99 52.3	D = - 4.48 +	4.41 sin(1.0 m - 85.7)*
2	Vera Cruz, Mexico.	19 11.9	96 08.8	D = - 5.09 +	4.22 sin(1.2 m - 63.4)*
3	City of Mexico, Mex.	19 26.0	99 11.6	D = - 5.34 +	3.28 sin(1.0 m - 87.9)*
4	San Blas, Mex.	21 32.5	105 18.4	D = - 5.21 +	4.26 sin(1.15 m - 96.5)
5	San Lucas, Lower Cal.	22 53.3	109 54.7	D = - 5.94 +	3.68 sin(1.20 m - 116.8)*
6	Magdalena Bay, Lower Cal.	24 38.4	112 08.9	D = - 6.33 +	4.17 sin(1.15 m - 119.2)*
7	Cerros Island, Lower Cal.	28 04	115 12	D = - 7.40 +	4.61 sin(1.05 m - 107.0)
8	El Paso, Tex.	31 45.5	106 27.0	D = - 9.08 +	3.40 sin(1.3 m - 108.4)
9	San Diego, Cal.	32 42.1	117 14.3	D = - 10.32 +	3.00 sin(1.10 m - 126.5)
10	Santa Barbara, Cal.	34 24.2	119 43.0	D = - 11.52 +	3.32 sin(1.10 m - 123.1)
11	Monterey, Cal.	36 36.1	121 53.6	D = - 13.25 +	2.83 sin(1.10 m - 144.0)
12	San Francisco, Cal.	37 47.5	122 27.3	D = - 13.94 +	2.65 sin(1.05 m - 135.5)
13	Cape Mendocino, Cal.	40 26.3	124 24.3	D = - 15.25 +	2.45 sin(1.10 m - 128.0)*
14	Salt Lake City, Utah.	40 46.1	111 53.8	D = - 12.40 +	4.25 sin(1.4 m - 121.6)*
15	Vancouver, Wash.	45 37.5	122 39.7	D = - 17.93 +	3.12 sin(1.35 m - 134.1)*
16	Walla Walla, Wash.	46 04	118 22	D = - 17.80 +	3.30 sin(1.3 m - 129.0)*
17	Cape Disappointment, Wash.	46 16.7	124 02.8	D = - 19.39 +	2.54 sin(1.25 m - 158.7)
18	Seattle, Wash.	47 35.9	122 20.0	D = - 19.19 +	3.14 sin(1.4 m - 136.1)*
19	Port Townsend, Wash.	48 07.0	122 44.9	D = - 18.84 +	3.00 sin(1.45 m - 122.1)
20	Neah Bay, Wash.	48 21.8	124 38.0	D = - 19.83 +	2.91 sin(1.40 m - 141.6)
21	Nootka, Vancouver Isl.	49 35.5	126 37.5	D = - 21.25 +	2.74 sin(1.30 m - 152.0)*
22	Captain's and Iliuliuk Harbors.	53 52.6	166 31.5	D = - 18.01 +	1.82 sin(1.3 m - 69.6)*
23	Sitka, Alaska.	57 02.9	135 19.7	D = - 25.79 +	3.30 sin(1.30 m - 104.2)
24	St. Paul, Kadiak Island.	57 48.0	152 21.3	D = - 22.21 +	5.18 sin(1.35 m - 72.5)
25	Port Mulgrave, Alaska.	59 33.7	139 45.9	D = - 24.03 +	7.77 sin(1.30 m - 85.8)
26	Port Etches, Alaska.	60 20.7	146 37.6	D = - 23.71 +	7.89 sin(1.35 m - 80.9)
27	Port Clarence, Alaska.	65 16	166 50	D = - 18.98 +	7.99 sin(1.3 m - 68.4)*
28	Chamisso Isl., Alaska.	66 13	161 49	D = - 23.62 +	7.64 sin(1.3 m - 64.0)*
29	Petropaulovsk, Siberia.	53 01	201 17	D = - 3.35 +	2.97 sin(1.3 m + 12.2)

TABLE IX.

ANGULAR CONVERGENCES AND DISTANCES BETWEEN MERIDIANS.

1. Angular convergence of meridians per mile of easting or westing.
2. Distance between meridians converging by one minute.

LATI- TUDE.	ANGULAR CON- VERGENCE PER MILE. MINUTES.	DISTANCE FOR CONVERGENCE OF 1'. FEET.	LATI- TUDE.	ANGULAR CON- VERGENCE PER MILE. MINUTES.	DISTANCE FOR CONVERGENCE OF 1'. FEET.
0			0		
1	0.015	348733	31	0.521	10140
2	.030	174314	32	.542	9751
3	.045	116150	33	.563	9382
4	.061	87052	34	.585	9034
5	.076	69578	35	.607	8703
6	.091	57917	36	.630	8387
7	.107	49578	37	.653	8087
8	.122	43337	38	.677	7801
9	.137	38436	39	.702	7527
10	.153	34525	40	.727	7265
11	.169	31320	41	.753	7013
12	.184	28642	42	.780	6770
13	.200	26371	43	.808	6537
14	.216	24419	44	.836	6313
15	.232	22723	45	.866	6097
16	.249	21234	46	.897	5888
17	.265	19916	47	.929	5686
18	.282	18740	48	.962	5491
19	.299	17685	49	.998	5301
20	.316	16731	50	1.032	5118
21	.333	15864	51	1.069	4940
22	.350	15073	52	1.108	4766
23	.368	14348	53	1.149	4597
24	.386	13680	54	1.191	4433
25	.404	13062	55	1.236	4271
26	.423	12488	56	1.283	4115
27	.442	11955	57	1.333	3962
28	.461	11457	58	1.385	3813
29	.480	10990	59	1.440	3666
30	.500	10552	60	1.499	3523

TABLE X.<sup>1</sup>

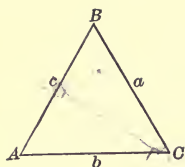
LENGTH OF ONE MINUTE OF LATITUDE AND ONE MINUTE OF LONGITUDE TO THE NEAREST WHOLE FOOT.

LATITUDE.	1' LATITUDE. FEET.	1' LONGITUDE. FEET.	LATITUDE.	1' LATITUDE. FEET.	1' LONGITUDE. FEET.
°			°		
1	6046	6086	31	6062	5222
2	6046	6083	32	6063	5167
3	6046	6079	33	6064	5110
4	6046	6072	34	6065	5052
5	6046	6064	35	6066	4992
6	6047	6054	36	6067	4930
7	6047	6042	37	6068	4867
8	6047	6028	38	6069	4803
9	6047	6013	39	6070	4737
10	6048	5995	40	6071	4670
11	6048	5976	41	6072	4601
12	6049	5955	42	6074	4531
13	6049	5932	43	6075	4459
14	6050	5908	44	6076	4386
15	6050	5881	45	6077	4312
16	6051	5853	46	6078	4236
17	6051	5823	47	6079	4159
18	6052	5791	48	6080	4081
19	6052	5758	49	6081	4001
20	6053	5722	50	6082	3921
21	6054	5685	51	6083	3839
22	6055	5647	52	6084	3756
23	6055	5606	53	6085	3671
24	6056	5564	54	6086	3586
25	6057	5520	55	6087	3499
26	6058	5475	56	6088	3412
27	6059	5427	57	6089	3323
28	6059	5379	58	6090	3234
29	6060	5328	59	6091	3143
30	6061	5276	60	6092	3051

<sup>1</sup> Abbreviated from the Smithsonian Geographical Tables.







$$23. o = \sqrt{h^2 - a^2} = \sqrt{(h+a)(h-a)}.$$

$$24. a = \sqrt{h^2 - o^2} = \sqrt{(h+o)(h-o)}.$$

$$25. h = \sqrt{o^2 + a^2}.$$

$$26. \text{Area} = \frac{oa}{2}.$$

Oblique triangles may be solved by some one of the following formulas:

GIVEN.	SOUGHT.	FORMULAS.
27. $A, B, a,$	$C, b, c,$	$C = 180^\circ - (A + B), b = \frac{a}{\sin A} \sin B,$ $c = \frac{a}{\sin A} \sin (A + B).$
28. $A, a, b,$	$B, C, c,$	$\sin B = \frac{\sin A}{a} b, C = 180^\circ - (A + B),$ $c = \frac{a}{\sin A} \sin C.$
29. $C, a, b,$	$\frac{1}{2}(A + B),$	$\frac{1}{2}(A + B) = 90^\circ - \frac{1}{2}C.$
30.	$\frac{1}{2}(A - B),$	$\tan \frac{1}{2}(A - B) = \frac{a - b}{a + b} \tan \frac{1}{2}(A + B).$
31.	$A, B,$	$A = \frac{1}{2}(A + B) + \frac{1}{2}(A - B);$ $B = \frac{1}{2}(A + B) - \frac{1}{2}(A - B).$
32.	$c,$	$c = (a + b) \frac{\cos \frac{1}{2}(A + B)}{\cos \frac{1}{2}(A - B)}$ $= (a - b) \frac{\sin \frac{1}{2}(A + B)}{\sin \frac{1}{2}(A - B)}.$
33.	Area,	$\text{Area} = \frac{1}{2} ab \sin C.$
34. $a, b, c,$	$A,$	<p>If <math>s = \frac{1}{2}(a + b + c),</math></p> $\sin \frac{1}{2} A = \sqrt{\frac{(s - b)(s - c)}{bc}},$ $\cos \frac{1}{2} A = \sqrt{\frac{s(s - a)}{bc}},$ $\tan \frac{1}{2} A = \sqrt{\frac{(s - b)(s - c)}{s(s - a)}}.$ $\sin A = \frac{2 \sqrt{s(s - a)(s - b)(s - c)}}{bc},$ $\text{vers } A = \frac{2(s - b)(s - c)}{bc}.$
35.	Area,	$\text{Area} = \sqrt{s(s - a)(s - b)(s - c)}.$
36. $A, B, C, a,$	Area,	$\text{Area} = \frac{a^2 \sin B \sin C}{2 \sin A}.$

From the definitions of the trigonometric functions, the geometrical properties of right triangles and in some cases algebraic transformations, it may be shown that if  $A$  is any angle and  $B$  any other angle,

$$37. \quad \sin^2 A + \cos^2 A = 1.$$

$$\begin{aligned} 38. \quad \sin A &= \frac{1}{\operatorname{cosec} A} = \sqrt{1 - \cos^2 A} = \tan A \cos A \\ &= 2 \sin \frac{1}{2} A \cos \frac{1}{2} A = \operatorname{vers} A \cot \frac{1}{2} A \\ &= \sqrt{\frac{1}{2} \operatorname{vers} 2 A} = \sqrt{\frac{1}{2} (1 - \cos 2 A)}. \end{aligned}$$

$$\begin{aligned} 39. \quad \cos A &= \frac{1}{\sec A} = \sqrt{1 - \sin^2 A} = \cot A \sin A \\ &= 1 - \operatorname{vers} A = 2 \cos^2 \frac{1}{2} A - 1 = 1 - 2 \sin^2 \frac{1}{2} A \\ &= \cos^2 \frac{1}{2} A - \sin^2 \frac{1}{2} A = \sqrt{\frac{1}{2} + \frac{1}{2} \cos 2 A}. \end{aligned}$$

$$\begin{aligned} 40. \quad \tan A &= \frac{\sin A}{\cos A} = \frac{1}{\cot A} = \sqrt{\sec^2 A - 1} \\ &= \sqrt{\frac{1}{\cos^2 A} - 1} = \frac{\sqrt{1 - \cos^2 A}}{\cos A} = \frac{\sin 2 A}{1 + \cos 2 A} \\ &= \frac{1 - \cos 2 A}{\sin 2 A} = \frac{\operatorname{vers} 2 A}{\sin 2 A} = \cot \frac{1}{2} A (\sec A - 1). \end{aligned}$$

$$\begin{aligned} 41. \quad \cot A &= \frac{\cos A}{\sin A} = \frac{1}{\tan A} = \sqrt{\operatorname{cosec}^2 A - 1} \\ &= \frac{\sin 2 A}{1 - \cos 2 A} = \frac{\sin 2 A}{\operatorname{vers} 2 A} = \frac{1 + \cos 2 A}{\sin 2 A} = \frac{\tan \frac{1}{2} A}{\sec A - 1}. \end{aligned}$$

$$42. \quad \operatorname{vers} A = 1 - \cos A = \sin A \tan \frac{1}{2} A = 2 \sin^2 \frac{1}{2} A = \cos A (\sec A - 1).$$

$$43. \quad \sin (A \pm B) = \sin A \cos B \pm \sin B \cos A.$$

$$44. \quad \cos (A \pm B) = \cos A \cos B \mp \sin A \sin B.$$

$$45. \quad \sin \frac{1}{2} A = \sqrt{\frac{1 - \cos A}{2}} = \sqrt{\frac{\operatorname{vers} A}{2}}.$$

$$46. \quad \sin 2 A = 2 \sin A \cos A.$$

$$47. \quad \cos \frac{1}{2} A = \sqrt{\frac{1 + \cos A}{2}}.$$

$$48. \quad \cos 2 A = 2 \cos^2 A - 1 = \cos^2 A - \sin^2 A = 1 - 2 \sin^2 A.$$

$$49. \quad \tan \frac{1}{2} A = \frac{\tan A}{1 + \sec A} = \operatorname{cosec} A - \cot A = \frac{1 - \cos A}{\sin A} = \sqrt{\frac{1 - \cos A}{1 + \cos A}}.$$

$$50. \quad \tan 2 A = \frac{2 \tan A}{1 - \tan^2 \frac{1}{2} A}.$$

$$51. \quad \cot \frac{1}{2} A = \frac{\sin A}{\operatorname{vers} A} = \frac{1 + \cos A}{\sin A} = \frac{1}{\operatorname{cosec} A - \cot A}.$$

$$52. \cot 2A = \frac{\cot^2 A - 1}{2 \cot A}.$$

$$53. \text{vers } \frac{1}{2} A = \frac{\frac{1}{2} \text{vers } A}{1 + \sqrt{1 - \frac{1}{2} \text{vers } A}} = \frac{1 - \cos A}{2 + \sqrt{2(1 + \cos A)}}.$$

$$54. \text{vers } 2A = 2 \sin^2 A.$$

$$55. \sin A + \sin B = 2 \sin \frac{1}{2}(A + B) \cos \frac{1}{2}(A - B).$$

$$56. \sin A - \sin B = 2 \cos \frac{1}{2}(A + B) \sin \frac{1}{2}(A - B).$$

$$57. \cos A + \cos B = 2 \cos \frac{1}{2}(A + B) \cos \frac{1}{2}(A - B).$$

$$58. \cos B - \cos A = 2 \sin \frac{1}{2}(A + B) \sin \frac{1}{2}(A - B).$$

$$59. \sin^2 A - \sin^2 B = \cos^2 B - \cos^2 A = \sin(A + B) \sin(A - B).$$

$$60. \cos^2 A - \sin^2 B = \cos(A + B) \cos(A - B).$$

$$61. \tan A + \tan B = \frac{\sin(A + B)}{\cos A \cos B}.$$

$$62. \tan A - \tan B = \frac{\sin(A - B)}{\cos A \cos B}.$$

TABLE XII.

LENGTHS OF CIRCULAR ARCS OF RADIUS 1, AND VARIOUS  
CIRCULAR MEASURES.

NO.	DEGREES.	MINUTES.	SECONDS.	NO.	DEGREES.	MINUTES.	SECONDS.
1	.0174533	.0002909	.0000048	6	.1047198	.0017453	.0000291
2	.0349066	.0005818	.0000097	7	.1221730	.0020362	.0000339
3	.0523599	.0008727	.0000145	8	.1396263	.0023271	.0000388
4	.0698132	.0011636	.0000194	9	.1570796	.0026180	.0000436
5	.0872665	.0014544	.0000242	10	.1745329	.0029089	.0000485

Degrees in arc of length equal to radius,  $57.^\circ 295\,780$ .

Degrees in arc of length equal to  $\pi$ ,  $180.^\circ 000\,000$ .

Circumference =  $2\pi r =$   $360.^\circ 000\,000$ .

Area  $= \pi r^2$ .

If  $l$  = length of circular arc  
 $d$  = number of degrees in same  
 $r$  = radius of same  
 $c$  = chord of same  
 $m$  = middle ordinate

$$\left\{ \begin{array}{l} d = \frac{l}{r} \cdot \frac{180^\circ}{\pi}. \\ r = \frac{l}{d} \cdot \frac{180^\circ}{\pi}. \\ l = \frac{d}{180} \pi r. \\ \text{Area of sector} = \frac{1}{2} lr. \\ \text{Area of sector} = \frac{d}{360} \pi r^2. \\ \text{Approximate area of segment} = \frac{2}{3} cm. \end{array} \right.$$

TABLE XIII.

## LINEAR TRANSFORMATIONS.

## 1. Gunter's Chains to Feet.

CHAINS.	0.0	0.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0		.66	1.32	1.98	2.64	3.30	3.96	4.62	5.28	5.94
.1	6.60	7.26	7.92	8.58	9.24	9.90	10.56	11.22	11.88	12.54
.2	13.20	13.86	14.52	15.18	15.84	16.50	17.16	17.82	18.48	19.14
.3	19.80	20.46	21.12	21.78	22.44	23.10	23.76	24.42	25.08	25.74
.4	26.40	27.06	27.72	28.38	29.04	29.70	30.36	31.02	31.68	32.34
.5	33.00	33.66	34.32	34.98	35.64	36.30	36.96	37.62	38.28	38.94
.6	39.60	40.26	40.92	41.58	42.24	42.90	43.56	44.22	44.88	45.54
.7	46.20	46.86	47.52	48.18	48.84	49.50	50.16	50.82	51.48	52.14
.8	52.80	53.46	54.12	54.78	55.44	56.10	56.76	57.42	58.08	58.74
.9	59.40	60.06	60.72	61.38	62.04	62.70	63.36	64.02	64.68	65.34

	0.0	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0
0.0		66	132	198	264	330	396	462	528	594
10.0	660	726	792	858	924	990	1056	1122	1188	1254
20.0	1320	1386	1452	1518	1584	1650	1716	1782	1848	1914
30.0	1980	2046	2112	2178	2244	2310	2376	2442	2508	2574
40.0	2640	2706	2772	2838	2904	2970	3036	3102	3168	3234
50.0	3300	3366	3432	3498	3564	3630	3696	3762	3828	3894
60.0	3960	4026	4092	4158	4224	4290	4356	4422	4488	4554
70.0	4620	4686	4752	4818	4884	4950	5016	5082	5148	5214
80.0	5280	5346	5412	5478	5544	5610	5676	5742	5808	5874

2. Gunter's Chains to Meters.

CHAINS.	0.0	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	m.	m.	m.	m.	m.	m.	m.	m.	m.	m.
.1	—	.2012	.4023	.6035	.8047	1.0058	1.2070	1.4082	1.6093	1.8105
.2	2.0117	2.2128	2.4140	2.6152	2.8163	3.0175	3.2187	3.4198	3.6210	3.8222
.3	4.0233	4.2245	4.4257	4.6268	4.8280	5.0292	5.2303	5.4315	5.6326	5.8338
.4	6.0350	6.2361	6.4373	6.6385	6.8396	7.0408	7.2420	7.4431	7.6443	7.8455
.5	8.0466	8.2478	8.4490	8.6501	8.8513	9.0525	9.2536	9.4548	9.6560	9.8571
.6	10.0583	10.2595	10.4606	10.6618	10.8630	11.0641	11.2653	11.4665	11.6676	11.8688
.7	12.0700	12.2711	12.4723	12.6735	12.8746	13.0758	13.2770	13.4781	13.6793	13.8805
.8	14.0816	14.2828	14.4840	14.6851	14.8863	15.0875	15.2886	15.4898	15.6910	15.8921
.9	16.0933	16.2945	16.4956	16.6968	16.8980	17.0991	17.3003	17.5015	17.7026	17.9038
	18.1050	18.3061	18.5073	18.7084	18.9096	19.1108	19.3119	19.5131	19.7143	19.9154
	0.0	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0
0.0	—	20.1166	40.2332	60.3499	80.4665	100.5831	120.6996	140.8163	160.9329	181.0495
10.	201.1662	221.2828	241.3994	261.5160	281.6326	301.7493	321.8659	341.9825	362.0991	382.2157
20.	402.3323	422.4489	442.5656	462.6822	482.7988	502.9154	523.0320	543.1487	563.2653	583.3819
30.	603.4985	623.6151	643.7317	663.8483	683.9649	704.0816	724.1982	744.3148	764.4314	784.5480
40.	804.6646	824.7812	844.8979	865.0145	885.1311	905.2477	925.3643	945.4810	965.5976	985.7142
50.	1005.8308	1025.9474	1046.0640	1066.1806	1086.2973	1106.4139	1126.5305	1146.6471	1166.7637	1186.8803
60.	1206.9969	1227.1135	1247.2302	1267.3468	1287.4634	1307.5800	1327.6966	1347.8133	1367.9299	1388.0465
70.	1408.1631	1428.2797	1448.3963	1468.5129	1488.6296	1508.7462	1528.8628	1548.9794	1569.0960	1589.2126
80.	1609.3292	1629.4459	1649.5625	1669.6791	1689.7957	1709.9123	1730.0290	1750.1456	1770.2622	1790.3788



## 3. Feet to Meters.

FEET.	0	1	2	3	4	5	6	7	8	9
	Meters.	Meters.	Meters.	Meters.	Meters.	Meters.	Meters.	Meters.	Meters.	Meters.
0	0.000	0.305	0.610	0.914	1.219	1.524	1.829	2.134	2.438	2.743
10	3.048	3.353	3.658	3.962	4.267	4.572	4.877	5.182	5.486	5.791
20	6.036	6.401	6.706	7.010	7.315	7.620	7.925	8.229	8.534	8.839
30	9.144	9.449	9.753	10.058	10.363	10.668	10.972	11.277	11.582	11.887
40	12.192	12.496	12.801	13.106	13.411	13.716	14.020	14.325	14.630	14.935
50	15.239	15.544	15.849	16.154	16.459	16.763	17.068	17.373	17.678	17.983
60	18.287	18.592	18.897	19.202	19.507	19.811	20.116	20.421	20.726	21.031
70	21.335	21.640	21.945	22.250	22.555	22.859	23.164	23.469	23.774	24.079
80	24.383	24.688	24.993	25.298	25.602	25.907	26.212	26.517	26.822	27.126
90	27.431	27.736	28.041	28.346	28.651	28.955	29.260	29.565	29.870	30.174
100	30.479	30.784	31.089	31.394	31.698	32.003	32.308	32.613	32.918	33.222

## 4. Meters to Feet.

METERS.	0	1	2	3	4	5	6	7	8	9
	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.
0	0.00	3.28	6.56	9.84	13.12	16.40	19.69	22.97	26.25	29.53
10	32.81	36.09	39.37	42.65	45.93	49.21	52.49	55.78	59.06	62.34
20	65.62	68.90	72.18	75.46	78.74	82.02	85.30	88.58	91.87	95.15
30	98.43	101.71	104.99	108.27	111.55	114.83	118.11	121.39	124.67	127.96
40	131.24	134.52	137.80	141.08	144.36	147.64	150.92	154.20	157.48	160.76
50	164.04	167.33	170.61	173.89	177.17	180.45	183.73	187.01	190.29	193.57
60	196.85	200.13	203.42	206.70	209.98	213.26	216.54	219.82	223.10	226.38
70	229.66	232.94	236.22	239.51	242.79	246.07	249.35	252.63	255.91	259.19
80	262.47	265.75	269.03	272.31	275.60	278.88	282.16	285.44	288.72	292.00
90	295.28	298.56	301.84	305.12	308.40	311.69	314.97	318.25	321.53	324.81
100	328.09	331.37	334.65	337.93	341.21	344.49	347.78	351.06	354.34	357.62

1 statute mile = 1.6093 kilometers

1 kilometer = 0.6214 statute miles



TABLE XIV.

## HORIZONTAL DISTANCES AND DIFFERENCES OF ELEVATION.

For stadia readings of 100 units at various vertical angles. The values for other readings are obtained by multiplying the quantities under the proper vertical angle by the stadia reading in *hundreds of units*; thus, if the reading is 204, multiply by 2.04. Use a slide rule. Computed by Mr. Arthur Winslow while assistant geologist, second Geological Survey of Pennsylvania.

M.	0°		1°		2°		3°		4°		5°		6°		7°		8°		9°		10°	
	Hor.	Diff.	Hor.	Diff.	Hor.	Diff.	Hor.	Diff.	Hor.	Diff.	Hor.	Diff.	Hor.	Diff.	Hor.	Diff.	Hor.	Diff.	Hor.	Diff.	Hor.	Diff.
	Dist.	Elev.	Dist.	Elev.	Dist.	Elev.	Dist.	Elev.	Dist.	Elev.	Dist.	Elev.	Dist.	Elev.	Dist.	Elev.	Dist.	Elev.	Dist.	Elev.	Dist.	Elev.
0	100.00	0.00	99.97	1.74	99.88	3.49	99.73	5.23	99.51	6.96	99.24	8.68	98.91	10.40	98.51	12.10	98.06	13.78	97.55	15.45	96.98	17.10
2	100.00	0.06	99.97	1.86	99.87	3.55	99.72	5.28	99.51	7.02	99.23	8.74	98.90	10.45	98.50	12.15	98.05	13.84	97.53	15.51	96.96	17.16
4	100.00	0.12	99.97	1.86	99.87	3.60	99.71	5.34	99.50	7.07	99.22	8.80	98.88	10.51	98.48	12.21	98.03	13.89	97.52	15.56	96.94	17.21
6	100.00	0.17	99.96	1.92	99.87	3.66	99.71	5.40	99.49	7.13	99.20	8.85	98.87	10.57	98.47	12.26	98.01	13.95	97.50	15.62	96.92	17.26
8	100.00	0.23	99.96	1.98	99.86	3.72	99.70	5.46	99.48	7.19	99.20	8.91	98.86	10.62	98.46	12.32	98.00	14.01	97.48	15.67	96.90	17.32
10	100.00	0.29	99.96	2.04	99.86	3.78	99.69	5.52	99.47	7.25	99.19	8.97	98.85	10.68	98.44	12.38	97.98	14.06	97.46	15.73	96.88	17.37
12	100.00	0.35	99.96	2.09	99.85	3.84	99.69	5.57	99.46	7.30	99.18	9.03	98.83	10.74	98.43	12.43	97.97	14.12	97.44	15.78	96.86	17.43
14	100.00	0.41	99.95	2.15	99.85	3.90	99.68	5.63	99.46	7.36	99.17	9.08	98.82	10.79	98.41	12.49	97.95	14.17	97.43	15.84	96.84	17.48
16	100.00	0.47	99.95	2.21	99.84	3.95	99.68	5.69	99.45	7.42	99.16	9.14	98.81	10.85	98.40	12.55	97.93	14.23	97.41	15.89	96.82	17.54
18	100.00	0.52	99.95	2.27	99.84	4.01	99.67	5.75	99.44	7.48	99.15	9.20	98.80	10.91	98.39	12.60	97.92	14.34	97.39	15.95	96.80	17.59
20	100.00	0.58	99.95	2.33	99.83	4.07	99.66	5.80	99.43	7.53	99.14	9.25	98.78	11.00	98.37	12.66	97.90	14.38	97.37	16.00	96.78	17.65
22	100.00	0.64	99.94	2.38	99.83	4.13	99.66	5.86	99.42	7.59	99.13	9.31	98.77	11.02	98.36	12.72	97.88	14.40	97.35	16.06	96.76	17.70
24	100.00	0.70	99.94	2.44	99.82	4.18	99.65	5.92	99.41	7.65	99.11	9.37	98.76	11.08	98.34	12.77	97.87	14.45	97.33	16.11	96.74	17.76
26	99.99	0.76	99.94	2.50	99.82	4.24	99.64	5.98	99.40	7.71	99.10	9.43	98.76	11.13	98.33	12.83	97.85	14.51	97.31	16.17	96.72	17.81
28	99.99	0.81	99.93	2.56	99.81	4.30	99.63	6.04	99.39	7.76	99.09	9.48	98.73	11.19	98.31	12.88	97.83	14.56	97.29	16.22	96.70	17.86
30	99.99	0.87	99.93	2.62	99.81	4.36	99.63	6.09	99.38	7.82	99.08	9.54	98.72	11.25	98.29	12.94	97.82	14.62	97.26	16.28	96.68	17.92
32	99.99	0.93	99.93	2.67	99.80	4.42	99.62	6.15	99.38	7.88	99.07	9.60	98.71	11.30	98.28	13.00	97.80	14.67	97.26	16.33	96.66	17.97
34	99.99	0.99	99.93	2.73	99.80	4.48	99.62	6.21	99.37	7.94	99.06	9.65	98.69	11.36	98.27	13.05	97.78	14.73	97.24	16.39	96.64	18.03
36	99.99	1.05	99.92	2.79	99.79	4.53	99.61	6.27	99.36	7.99	99.05	9.71	98.68	11.42	98.25	13.11	97.76	14.79	97.22	16.44	96.62	18.08
38	99.99	1.11	99.92	2.85	99.79	4.59	99.60	6.33	99.35	8.05	99.04	9.77	98.67	11.47	98.24	13.17	97.75	14.84	97.20	16.50	96.60	18.14
40	99.99	1.16	99.92	2.91	99.78	4.65	99.59	6.38	99.34	8.11	99.03	9.83	98.65	11.53	98.22	13.22	97.73	14.90	97.18	16.55	96.57	18.19
42	99.99	1.22	99.91	2.97	99.78	4.71	99.59	6.44	99.33	8.17	99.01	9.88	98.64	11.59	98.20	13.28	97.71	14.99	97.16	16.61	96.55	18.24
44	99.98	1.28	99.91	3.02	99.77	4.76	99.58	6.50	99.32	8.22	99.00	9.94	98.63	11.64	98.19	13.33	97.69	15.01	97.14	16.66	96.53	18.30
46	99.98	1.34	99.90	3.08	99.77	4.82	99.57	6.56	99.31	8.28	98.99	10.00	98.61	11.70	98.17	13.39	97.68	15.06	97.12	16.72	96.51	18.35
48	99.98	1.40	99.90	3.14	99.76	4.88	99.56	6.61	99.30	8.34	98.98	10.05	98.60	11.76	98.16	13.45	97.66	15.12	97.10	16.77	96.49	18.41
50	99.98	1.45	99.90	3.20	99.76	4.94	99.56	6.67	99.29	8.40	98.97	10.11	98.58	11.81	98.14	13.56	97.64	15.17	97.08	16.83	96.47	18.46
52	99.98	1.51	99.89	3.26	99.75	4.99	99.55	6.73	99.28	8.45	98.96	10.17	98.57	11.87	98.13	13.66	97.62	15.23	97.06	16.88	96.45	18.51
54	99.98	1.57	99.89	3.31	99.74	5.05	99.54	6.78	99.27	8.51	98.94	10.26	98.56	11.93	98.11	13.61	97.61	15.28	97.04	16.94	96.42	18.57
56	99.97	1.63	99.88	3.37	99.74	5.11	99.53	6.84	99.26	8.57	98.93	10.28	98.54	12.00	98.10	13.67	97.59	15.34	97.02	16.99	96.40	18.62
58	99.97	1.69	99.88	3.43	99.73	5.17	99.52	6.90	99.25	8.63	98.92	10.34	98.53	12.04	98.08	13.73	97.57	15.40	97.00	17.05	96.38	18.68
60	99.97	1.74	99.88	3.49	99.73	5.23	99.51	6.96	99.24	8.68	98.91	10.40	98.51	12.10	98.06	13.78	97.55	15.45	96.98	17.10	96.36	18.73
$\phi = 0.75$	0.75	0.01	1.00	0.02	0.75	0.03	0.75	0.05	0.75	0.06	0.75	0.07	0.75	0.08	0.74	0.10	0.74	0.11	0.74	0.12	0.74	0.14
$\phi = 1.00$	1.00	0.01	1.00	0.03	1.00	0.04	1.00	0.06	1.00	0.08	0.99	0.09	0.99	0.11	0.99	0.13	0.99	0.15	0.99	0.16	0.98	0.18
$\phi = 1.25$	1.25	0.02	1.25	0.03	1.25	0.05	1.25	0.08	1.25	0.10	1.24	0.11	1.24	0.14	1.24	0.16	1.23	0.18	1.23	0.21	1.23	0.23

TABLE XIV. (continued).

M.	11°			12°			13°			14°			15°			16°			17°			18°			19°			20°		
	Hor. Dist.	Diff. Elev.		Hor. Dist.	Diff. Elev.		Hor. Dist.	Diff. Elev.		Hor. Dist.	Diff. Elev.		Hor. Dist.	Diff. Elev.		Hor. Dist.	Diff. Elev.		Hor. Dist.	Diff. Elev.		Hor. Dist.	Diff. Elev.		Hor. Dist.	Diff. Elev.		Hor. Dist.	Diff. Elev.	
0	96.36	18.73		95.68	20.34	94.94	21.02		94.15	23.47	93.30	25.00		92.40	26.50		91.45	27.96		90.45	29.39		89.40	30.78		88.30	32.14			
2	96.34	18.78		95.65	20.39	94.91	21.07		94.12	23.52	93.27	25.05		92.37	26.59		91.42	28.01		90.42	29.44		89.36	30.83		88.26	32.18			
4	96.32	18.84		95.63	20.44	94.89	22.02		94.09	23.58	93.24	25.10		92.34	26.59		91.39	28.06		90.38	29.48		89.33	30.87		88.23	32.23			
6	96.29	18.89		95.61	20.50	94.86	22.08		94.07	23.63	93.21	25.15		92.31	26.64		91.35	28.10		90.35	29.53		89.29	30.92		88.19	32.27			
8	96.27	18.95		95.58	20.55	94.84	22.13		94.04	23.68	93.18	25.20		92.28	26.69		91.32	28.15		90.31	29.58		89.26	30.97		88.15	32.32			
10	96.25	19.00		95.56	20.60		94.81	22.18	94.01	23.73	93.16	25.25		92.25	26.74		91.29	28.20		90.28	29.62		89.22	31.01		88.11	32.36			
12	96.23	19.05		95.53	20.66	94.79	22.23		93.98	23.78	93.13	25.30		92.22	26.79		91.26	28.25		90.24	29.67		89.18	31.06		88.08	32.41			
14	96.21	19.11		95.51	20.71	94.76	22.28		93.95	23.83	93.10	25.35		92.19	26.84		91.22	28.30		90.21	29.72		89.15	31.10		88.04	32.45			
16	96.18	19.16		95.49	20.76	94.73	22.34		93.93	23.88	93.07	25.40		92.15	26.89		91.19	28.34		90.18	29.76		89.11	31.15		88.00	32.49			
18	96.16	19.21		95.46	20.81	94.71	22.39		93.90	23.93	93.04	25.45		92.12	26.94		91.16	28.39		90.14	29.76		89.08	31.19		87.96	32.54			
20	96.14	19.27		95.44	20.87	94.68	22.44		93.87	23.99	93.01	25.50		92.09	26.99		91.12	28.44		90.11	29.86		89.04	31.24		87.93	32.58			
22	96.12	19.32		95.41	20.92	94.66	22.49		93.84	24.04	92.98	25.55		92.06	27.04		91.09	28.49		90.07	29.90		89.00	31.28		87.89	32.63			
24	96.09	19.38		95.39	20.97	94.63	22.54		93.81	24.09	92.95	25.60		92.03	27.09		91.06	28.54		90.04	29.95		88.96	31.33		87.85	32.67			
26	96.07	19.43		95.36	21.03	94.60	22.60		93.79	24.14	92.92	25.65		92.00	27.13		91.02	28.58		90.00	30.00		88.93	31.38		87.81	32.72			
28	96.05	19.48		95.34	21.08	94.58	22.65		93.76	24.19	92.89	25.70		91.97	27.18		90.99	28.63		89.97	30.04		88.89	31.42		87.77	32.76			
30	96.03	19.54		95.32	21.13	94.55	22.70		93.73	24.24	92.86	25.75		91.93	27.23		90.96	28.68		89.93	30.09		88.86	31.47		87.74	32.80			
32	96.00	19.59		95.29	21.18	94.52	22.75		93.70	24.29	92.83	25.80		91.90	27.28		90.92	28.73		89.90	30.14		88.82	31.51		87.70	32.85			
34	95.98	19.64		95.27	21.24	94.50	22.80		93.67	24.34	92.80	25.85		91.87	27.33		90.89	28.77		89.86	30.19		88.78	31.56		87.66	32.89			
36	95.96	19.70		95.24	21.29	94.47	22.85		93.65	24.39	92.77	25.90		91.84	27.38		90.86	28.82		89.83	30.23		88.75	31.60		87.62	32.93			
38	95.93	19.75		95.22	21.34	94.44	22.91		93.62	24.44	92.74	25.95		91.81	27.43		90.82	28.87		89.79	30.28		88.71	31.65		87.58	32.98			
40	95.91	19.80		95.19	21.39	94.42	22.96		93.59	24.49	92.71	26.00		91.77	27.48		90.79	28.92		89.76	30.32		88.67	31.69		87.54	33.02			
42	95.89	19.86		95.17	21.45	94.39	23.01		93.56	24.55	92.68	26.05		91.74	27.52		90.76	28.96		89.72	30.37		88.64	31.74		87.51	33.07			
44	95.86	19.91		95.14	21.50	94.36	23.06		93.53	24.60	92.65	26.10		91.71	27.57		90.72	29.01		89.69	30.41		88.60	31.78		87.47	33.11			
46	95.84	19.96		95.12	21.55	94.34	23.11		93.50	24.65	92.62	26.15		91.68	27.62		90.69	29.06		89.65	30.46		88.56	31.83		87.43	33.15			
48	95.82	20.02		95.09	21.60	94.31	23.16		93.47	24.70	92.59	26.20		91.65	27.67		90.66	29.11		89.61	30.51		88.53	31.87		87.39	33.20			
50	95.79	20.07		95.07	21.66	94.28	23.22		93.45	24.75	92.56	26.25		91.61	27.72		90.62	29.15		89.58	30.55		88.49	31.92		87.35	33.24			
52	95.77	20.12		95.04	21.71	94.26	23.27		93.42	24.80	92.53	26.30		91.58	27.77		90.59	29.20		89.54	30.60		88.45	31.96		87.31	33.28			
54	95.75	20.18		95.02	21.76	94.23	23.32		93.39	24.85	92.49	26.35		91.55	27.81		90.55	29.25		89.51	30.65		88.41	32.01		87.27	33.33			
56	95.72	20.23		95.00	21.81	94.20	23.37		93.36	24.90	92.46	26.40		91.52	27.86		90.52	29.30		89.47	30.70		88.38	32.05		87.24	33.37			
58	95.70	20.28		94.97	21.87	94.17	23.42		93.33	24.95	92.43	26.45		91.48	27.91		90.48	29.34		89.44	30.74		88.34	32.09		87.20	33.41			
60	95.68	20.34		94.94	21.92	94.15	23.47		93.30	25.00	92.40	26.50		91.45	27.96		90.45	29.39		89.40	30.78		88.30	32.14		87.16	33.46			
60.75	0.73	0.15		0.73	0.16		0.73	0.17	0.73	0.19	0.72	0.20		0.72	0.21		0.72	0.23		0.71	0.24		0.71	0.25		0.70	0.26			
61.00	0.98	0.20		0.98	0.22		0.97	0.23	0.97	0.25	0.96	0.27		0.96	0.28		0.95	0.30		0.95	0.32		0.94	0.33		0.94	0.35			
61.25	1.22	0.25		1.22	0.27		1.21	0.29	1.21	0.31	1.20	0.34		1.20	0.36		1.19	0.38		1.19	0.40		1.18	0.42		1.17	0.44			

TABLE XIV. (concluded).

M.	21°		22°		23°		24°		25°		26°		27°		28°		29°		30°	
	Hor. Dist.	Diff. Elev.	Hor. Dist.	Diff. Elev.	Hor. Dist.	Diff. Elev.	Hor. Dist.	Diff. Elev.	Hor. Dist.	Diff. Elev.	Hor. Dist.	Diff. Elev.	Hor. Dist.	Diff. Elev.	Hor. Dist.	Diff. Elev.	Hor. Dist.	Diff. Elev.	Hor. Dist.	Diff. Elev.
0	87.16	33.46	85.97	34.73	84.73	35.97	83.46	37.16	82.14	38.30	80.78	39.40	79.39	40.45	77.96	41.45	76.50	42.40	75.00	43.30
2	87.12	33.50	85.93	34.77	84.69	36.01	83.41	37.20	82.09	38.34	80.74	39.44	79.34	40.49	77.91	41.48	76.45	42.43	74.95	43.33
4	87.08	33.54	85.89	34.82	84.65	36.05	83.37	37.23	82.05	38.38	80.69	39.47	79.30	40.52	77.86	41.52	76.40	42.46	74.90	43.36
6	87.04	33.59	85.85	34.86	84.61	36.09	83.33	37.27	82.01	38.41	80.65	39.51	79.25	40.55	77.81	41.55	76.35	42.49	74.85	43.39
8	87.00	33.63	85.80	34.90	84.57	36.13	83.28	37.31	81.96	38.45	80.60	39.54	79.20	40.59	77.77	41.58	76.30	42.53	74.80	43.42
10	86.96	33.67	85.76	34.94	84.52	36.17	83.24	37.35	81.92	38.49	80.55	39.58	79.15	40.62	77.72	41.61	76.25	42.56	74.75	43.45
12	86.92	33.72	85.72	34.98	84.48	36.21	83.20	37.39	81.87	38.53	80.51	39.61	79.11	40.66	77.67	41.65	76.20	42.59	74.70	43.47
14	86.88	33.76	85.68	35.02	84.44	36.25	83.15	37.43	81.83	38.56	80.46	39.65	79.06	40.69	77.62	41.68	76.15	42.62	74.65	43.49
16	86.84	33.80	85.64	35.07	84.40	36.29	83.11	37.47	81.78	38.60	80.41	39.69	79.01	40.72	77.57	41.71	76.10	42.65	74.60	43.53
18	86.80	33.84	85.60	35.11	84.35	36.33	83.07	37.51	81.74	38.64	80.37	39.72	78.96	40.76	77.52	41.74	76.05	42.68	74.55	43.56
20	86.77	33.89	85.56	35.15	84.31	36.37	83.02	37.54	81.69	38.67	80.32	39.76	78.92	40.79	77.48	41.77	76.00	42.71	74.49	43.59
22	86.73	33.93	85.52	35.19	84.27	36.41	82.98	37.58	81.65	38.71	80.28	39.79	78.87	40.82	77.42	41.81	75.95	42.74	74.44	43.62
24	86.69	33.97	85.48	35.23	84.23	36.45	82.93	37.62	81.60	38.75	80.23	39.83	78.82	40.86	77.38	41.84	75.90	42.77	74.39	43.65
26	86.65	34.01	85.44	35.27	84.18	36.49	82.89	37.66	81.56	38.78	80.18	39.86	78.77	40.89	77.33	41.87	75.85	42.80	74.34	43.67
28	86.61	34.06	85.40	35.31	84.14	36.53	82.85	37.70	81.51	38.82	80.14	39.90	78.73	40.92	77.28	41.90	75.80	42.83	74.29	43.70
30	86.57	34.10	85.36	35.36	84.10	36.57	82.80	37.74	81.47	38.86	80.09	39.93	78.68	40.96	77.23	41.93	75.75	42.86	74.24	43.73
32	86.53	34.14	85.31	35.40	84.06	36.61	82.76	37.77	81.42	38.89	80.04	39.97	78.63	40.99	77.18	41.97	75.70	42.89	74.19	43.76
34	86.49	34.18	85.27	35.44	84.01	36.65	82.72	37.81	81.38	38.93	80.00	40.00	78.58	41.02	77.13	42.00	75.65	42.92	74.14	43.79
36	86.45	34.23	85.23	35.48	83.97	36.69	82.67	37.85	81.33	38.97	79.95	40.04	78.54	41.06	77.09	42.03	75.60	42.95	74.09	43.82
38	86.41	34.27	85.19	35.52	83.93	36.73	82.63	37.89	81.28	39.00	79.90	40.07	78.49	41.09	77.04	42.06	75.55	42.98	74.04	43.84
40	86.37	34.31	85.15	35.56	83.89	36.77	82.58	37.93	81.24	39.04	79.86	40.11	78.44	41.12	76.99	42.09	75.50	43.01	73.99	43.87
42	86.33	34.35	85.11	35.60	83.84	36.80	82.54	37.96	81.19	39.08	79.81	40.14	78.39	41.16	76.94	42.12	75.45	43.04	73.93	43.90
44	86.29	34.40	85.07	35.64	83.80	36.84	82.49	38.00	81.15	39.11	79.76	40.18	78.34	41.19	76.89	42.15	75.40	43.07	73.88	43.93
46	86.25	34.44	85.02	35.68	83.76	36.88	82.45	38.04	81.10	39.15	79.72	40.21	78.30	41.22	76.84	42.19	75.35	43.10	73.83	43.95
48	86.21	34.48	84.98	35.72	83.72	36.92	82.41	38.08	81.06	39.18	79.67	40.24	78.25	41.26	76.79	42.22	75.30	43.13	73.78	43.98
50	86.17	34.52	84.94	35.76	83.67	36.96	82.36	38.11	81.01	39.22	79.62	40.28	78.20	41.29	76.74	42.25	75.25	43.16	73.73	44.01
52	86.13	34.57	84.90	35.80	83.63	37.00	82.32	38.15	80.97	39.26	79.58	40.31	78.15	41.32	76.69	42.28	75.20	43.18	73.68	44.04
54	86.09	34.61	84.86	35.85	83.59	37.04	82.27	38.19	80.92	39.29	79.53	40.35	78.10	41.35	76.64	42.31	75.15	43.21	73.63	44.07
56	86.05	34.65	84.82	35.89	83.54	37.08	82.23	38.23	80.87	39.33	79.48	40.38	78.06	41.39	76.59	42.34	75.10	43.24	73.58	44.09
58	86.01	34.69	84.78	35.93	83.50	37.12	82.18	38.26	80.83	39.36	79.44	40.42	78.01	41.42	76.55	42.37	75.05	43.27	73.52	44.12
60	85.97	34.73	84.73	35.97	83.46	37.16	82.14	38.30	80.78	39.40	79.39	40.45	77.96	41.45	76.50	42.40	75.00	43.30	73.47	44.15
c=0.75	0.70	0.27	0.69	0.29	0.69	0.30	0.68	0.31	0.68	0.32	0.67	0.33	0.66	0.35	0.66	0.36	0.65	0.37	0.65	0.38
c=1.00	0.93	0.37	0.92	0.38	0.92	0.40	0.91	0.41	0.90	0.42	0.89	0.45	0.89	0.46	0.88	0.48	0.87	0.49	0.86	0.51
c=1.25	1.16	0.46	1.15	0.48	1.15	0.50	1.14	0.52	1.13	0.54	1.12	0.56	1.11	0.58	1.10	0.60	1.09	0.62	1.08	0.64

## TABLES XV, XVI.

COMMON LOGARITHMS OF NUMBERS.

LOGARITHMS OF TRIGONOMETRIC FUNCTIONS.

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EDITED BY C. W. CROCKETT.

## NOTE.

THE well-known tables of Gauss, Hotél, Becker, and Albrecht have been taken as the standards, and the figures compared with the more extensive tables, the doubtful cases being recomputed.



# EXPLANATION OF THE TABLES

## INTRODUCTORY.

1. When we have a number with six or more decimal places, and we wish to use only five :

(a) If the sixth and following figures of the decimal are less than 5 in the sixth place, they are dropped ; thus, 0.46437 4999 is called 0.46437.

(b) If the sixth and following figures of the decimal are greater than 5 in the sixth place, the fifth place is increased by unity and the sixth and following places are dropped ; thus, 0.46437 5001 is called 0.46438.

(c) If the sixth figure of the decimal is 5, and if it is followed only by zeros, make the fifth figure the nearest *even* figure ; thus, 0.46437 500 is called 0.46438, while 0.46438 500 is also called 0.46438. The number is thus increased when the fifth figure is odd, and decreased when it is even, the two operations tending to neutralize each other in a series of computations, and hence to diminish the resultant error.

2. Hence any number obtained according to Art. 1 may be in error by half a unit in the fifth decimal place.

3. When the last figure of a number in these tables is 5, the number printed is too large, the 5 having been obtained according to Art. 1 (b) ; if the 5 is without the minus sign, the number printed is too small, the figures following the 5 having been dropped according to Art. 1 (a).

4. The marginal tables contain the products of the numbers at the top of the columns by 1, 2, 3, ... 9 *tenths*, and may be used in multiplying and dividing in interpolation.

(a) To multiply 38 by .746 :

$$\begin{aligned} 38 \times .7 &= &= 26.6 \\ 38 \times .4 &= 15.2 ; \therefore 38 \times .04 &= 1.52 \\ 38 \times .6 &= 22.8 ; \therefore 38 \times .006 &= \underline{.228} \\ \therefore 38 \times .746 &= 28.348 \end{aligned}$$

	38
1	3.8
2	7.6
3	11.4
4	15.2
5	19.0
6	22.8
7	26.6
8	30.4
9	34.2

In multiplying by the second figure (hundredths), the decimal point in the table is moved *one* place to the left ; in multiplying by the third (thousandths), *two* to the left ; and so on.

[illegible]

To divide 23 by 38 :

Dividend,	23		
	<u>22.8</u>		corresponding to .6
	2		
	<u>0.0</u>		corresponding to .00
	2 0.		
Nearest,	<u>19.0</u>		corresponding to .005
∴ Quotient,			.605

The computer should use the marginal tables mentally.

## LOGARITHMS.

5. The logarithm of a number is the exponent of the power to which a given number called the *base* must be raised to produce the first number. If  $A = e^a$ ,  $a$  is called the logarithm of the number  $A$  to the base  $e$ , written  $\log_e A = a$ .

6. If  $A = e^a$ , and  $B = e^b$ , or (omitting subscripts)  $\log A = a$ , and  $\log B = b$ , we have

$$A \times B = e^{a+b}; \therefore \log(A \times B) = a + b; \therefore \log(A \times B) = \log A + \log B.$$

$$A \div B = e^{a-b}; \therefore \log(A \div B) = a - b; \therefore \log(A \div B) = \log A - \log B.$$

$$A^n = e^{na} ; \quad \therefore \log(A^n) = na ; \quad \therefore \log(A^n) = n \log A.$$

$$\sqrt[n]{A} = e^{\frac{1}{n}a}; \quad \therefore \log \sqrt[n]{A} = \frac{1}{n}a; \quad \therefore \log \sqrt[n]{A} = \frac{1}{n} \log A.$$



7. When the base is not specified, it is generally understood that logarithms to the base 10, or *common logarithms*, are meant. In this system, since

$$0.001 = \frac{1}{1000} = \frac{1}{10^3} = 10^{-3}, \quad \log 0.001 = -3;$$

$$0.01 = \frac{1}{100} = \frac{1}{10^2} = 10^{-2}, \quad \log 0.01 = -2;$$

$$0.1 = \frac{1}{10} = \frac{1}{10^1} = 10^{-1}, \quad \log 0.1 = -1;$$

$$1. = 10^0, \quad \log 1 = 0;$$

$$10. = 10^1, \quad \log 10 = +1;$$

$$100. = 10^2, \quad \log 100 = +2;$$

$$1000. = 10^3, \quad \log 1000 = +3.$$

8. The logarithm of a number between 100 and 1000 will be a number between 2 and 3, or  $2 + m$  where  $m$  will be a decimal called the *mantissa*, the integral portion of the logarithm being the *characteristic*. The mantissa is always considered *positive*; thus  $\log 0.002$  will be a number between  $-2$  and  $-3$ , that is, either  $-3 + m$  or  $-2 - m'$ , the first form being used. We write  $\log 0.002 = \bar{3}.30103$ , the negative sign being placed over the characteristic to show that the characteristic alone is negative.

9. Since

$\log (A \times 10^n) = \log A + \log 10^n = \log A + n \log 10 = \log A + n$ ,  
and  $\log (A \div 10^n) = \log A - \log 10^n = \log A - n \log 10 = \log A - n$ ,  
we have, if  $\log 37.3 = 1.57171$ ,

$$\log 373. = 2.57171, \text{ and } \log 3.73 = 0.57171;$$

$$\log 3730 = 3.57171, \text{ and } \log 0.373 = \bar{1}.57171;$$

$$\log 37300 = 4.57171, \text{ and } \log 0.0373 = \bar{2}.57171.$$

Hence the position of the decimal point affects the characteristic alone, the mantissa being always the same for the same sequence of figures. For this reason the common system of logarithms is used in practice.

10. The characteristic is found as follows: *When the number is greater than 1, the characteristic is positive, and is one less than the number of digits to the left of the decimal point; when the number is less than 1, the characteristic is negative, and is one more than the number of zeros between the decimal point and the first significant figure.*

11. To avoid the use of negative characteristics we add 10 to the characteristic and write  $-10$  after the mantissa, *i.e.* adding and subtracting the same quantity, 10. Thus  $\log 0.2 = 1.30103$  would be written

9.30103 — 10. The — 10 is often omitted for brevity when there is no danger of confusion, but its existence must not be forgotten. Such logarithms are called *augmented* logarithms.

*In this case the characteristic of the logarithm of a pure decimal is 9 diminished by the number of ciphers to the left of the first significant figure.* Thus the characteristic of  $\log 0.004$  is  $9 - 2$ , or 7, and that of  $\log 0.94$  is  $9 - 0$ , or 9.

12. The arithmetical complement of the logarithm (written *colog*) of a number is the logarithm of its reciprocal, and is found by subtracting each figure of the logarithm from 9, commencing at the left, except the last significant figure on the right, which is subtracted from 10.

$$\text{For} \quad \log \frac{1}{x} = -\log x = 10 - \log x - 10;$$

$$\text{thus, if} \quad \log x = 2.46403, \text{ colog } x = 7.53597 - 10;$$

$$\text{if} \quad \log x = 8.43000 - 10, \text{ colog } x = 1.57000.$$

#### TABLE XV.

13. Page 397 contains the logarithms of numbers from 1 to 100, to five decimal places.

Pages 398–415 contain the mantissas of the logarithms of numbers from 1000 to 10009, to five decimal places.

Pages 416, 417, contain the mantissas of the logarithms of numbers from 10000 to 11009, to seven decimal places.

NOTE.—The mantissas of the logarithms of numbers, except those of the integral powers of 10, are incommensurable, the mantissas in the tables being found as shown in Art. 1.

#### *To find the Logarithm of a Number.*

14. The *characteristic* is found by the rules in Arts. 10 and 11, and the *mantissa* from the tables, as shown in Arts. 15, 16, 17, 18.

15. *When the number has four figures.*—Find on pages 398–415 the first three figures in the column marked *N*, and the fourth at the top of one of the other columns. The last three figures of the mantissa are found in this column on the horizontal line through the first three figures of the given number in column *N*. The first two figures of the mantissa are those under *L* in the same line with the number, or else those nearest above it, unless the last three figures of the mantissa as given in the tables are preceded by a \*, when the first two figures are found under *L* in the first line *below* the number. Thus (page 398),

$$\log 1136 = 3.05538; \log 1137 = 3.05576; \log 1138 = 3.05614;$$

$$\log 1370 = 3.13672; \log 1371 = 3.13704; \log 1372 = 3.13735;$$

$$\log 1380 = 3.13988; \log 1381 = 3.14019; \log 1382 = 3.14051.$$

16. *When the number has less than four figures, annex ciphers on the right and proceed as in Art. 15.* Thus,

$$\begin{aligned}\log 1.13 &= 0.05308; \log 12.8 = 1.10721; \log 130 = 2.11394; \\ \log 15 &= 1.17609; \log 16 = 1.20412; \log 17 = 1.23045.\end{aligned}$$

17. *When the number has more than four figures, as 11.4672.* — Since the mantissa is independent of the position of the decimal point, point off the first four figures and find the mantissa of  $\log 1146.72$ . This will be between the mantissas of  $\log 1146$  and  $\log 1147$ . Hence find from the tables the mantissas corresponding to 1146 and 1147; multiply the difference between them (called the tabular difference) by .72, and add the product (called the correction) to  $\log 11.46$ ; the result will be the logarithm required.

Mantissa of $\log 1146 = 05918$	$\log 11.46 = 1.05918$
Mantissa of $\log 1147 = 05956$	correction = $38 \times .72 = 27.36$
Tabular difference = 38	$\therefore \log 11.4672 = 1.05945 \ 36$
	or = 1.05945

NOTE. — Since any mantissa in the tables may be in error by half a unit in the fifth decimal place (Art. 2), no advantage is gained by using the sixth place in the interpolated logarithm. Thus, according to Art. 1, we drop the .36, and call  $\log 11.4672 = 1.05945$ .

NOTE. — The marginal tables should be used in multiplying the tabular difference to find the correction (Art. 4).

NOTE. — It is assumed that the change in the mantissa is proportional to that in the number, as the latter increases from 1146 to 1147. An increase of 1 in the number causes an increase of 38 in the mantissa; hence an increase of .72 in the number will cause an increase of  $38 \times .72$  in the mantissa.

NOTE. — We could also find the mantissa of  $\log 11.4672$  by subtracting the product of the tabular difference by .28 (or  $1.00 - .72$ ) from the mantissa corresponding to 1147; that is, the required mantissa is  $05956 - (38 \times .28) = 05956 - 10.64 = 05945$  as before.

18. *The general rule is: Find the mantissa corresponding to the first four figures of the number; multiply the tabular difference by the fifth and following figures treated as a decimal; and add the product to the mantissa just found.*

The tabular difference is the difference between the mantissas corresponding to the two numbers in the tables, between which the given number lies.

$$\begin{aligned}\log 1.62163 &= 0.20995; \log 0.38024 = \bar{1}.58006; \log 0.0852763 = \bar{2}.93083; \\ \log 189.524 &= 2.27767; \log 0.38602 = \bar{1}.58661; \log 0.0085938 = \bar{3}.93419; \\ \log 19983.4 &= 4.30067; \log 3.98743 = 0.60070; \log 0.090046 = \bar{2}.95446.\end{aligned}$$

NOTE. — Page 397 is used when the number contains less than three figures, the number being found in the column  $N$ , and the logarithm in the column headed  $\text{Log}$ . The characteristic is given for whole numbers, and must be changed for decimals.

NOTE. — When a number is composed of three figures, find on pages 398–415 the number in the column  $N$ , and the mantissa corresponding in the column  $L$ . o.

*To find the Number corresponding to a Given Logarithm.*

19. From the tables we find the sequence of figures corresponding to the given mantissa, as shown in Arts. 20, 21, and 22, the position of the decimal point being determined by the characteristic (Arts. 10, 11).

20. *When the given mantissa can be found in the tables.*— Find on pages 398–415 the first two figures of the mantissa under  $L$  in the column headed  $L$ . o. The last three figures of the mantissa are then sought for in the columns headed 0, 1, 2, ... 9, in the same line with the first two figures, or in one of the lines just below, or in the line next above (where they would be preceded by a \*). The first three figures of the required number will be found in the column headed  $N$ , in the same horizontal line with the last three figures of the mantissa, and the fourth figure of the number at the top of the column in which the last three figures of the mantissa are found. Thus (page 398),

$$\begin{aligned} 0.06221 &= \log 1.154; & 0.06558 &= \log 1.163; & 0.06893 &= \log 1.172; \\ 0.07004 &= \log 1.175; & 0.07188 &= \log 1.180; & 0.08063 &= \log 1.204. \end{aligned}$$

21. *When the given mantissa can not be found in the tables.*— If we wish to find the number whose logarithm is 2.16531, we enter the tables with 16531, and find that it lies between 16524 and 16554, so that the given mantissa corresponds to a number between 1463 and 1464. Also 16531 exceeds 16524 by 7, and this difference, divided by the tabular difference 30, gives .23... as the amount by which the required number exceeds 1463. Hence  $2.16531 = \log 146.323...$ , which we call 146.32, according to Art. 1, the incompleteness of the tables making the sixth figure uncertain.

NOTE. — The marginal tables should be used in dividing the difference between the given mantissa and the one next less in the tables by the tabular difference.

22. *The general rule is: Find the number corresponding to the mantissa in the tables next less than the given mantissa; divide the excess of the given mantissa over the one found in the tables by the tabular difference; and annex the quotient to the first four figures already found.*

The tabular difference is the difference between the two mantissas in the tables, between which the given mantissa lies.

$$\begin{aligned} 1.16600 &= \log 0.14656; & 0.18002 &= \log 1.5136; & 2.18200 &= \log 152.06; \\ 1.19000 &= \log 15.488; & 4.19680 &= \log 15773; & 1.20020 &= \log 15.856. \end{aligned}$$

23. For the use of the numbers  $S'$ ,  $T'$ ,  $S''$ ,  $T''$ , see Arts. 35–38.



TABLE XVI.

24. This table (pages 420–464) contains the logarithms, to five decimal places, of the trigonometric sines, cosines, tangents, and cotangents of angles from  $0^\circ$  to  $90^\circ$ , for each minute. The logarithms in the columns headed *L. Sin*, *L. Tan*, and *L. Cos*, are augmented, and should be diminished by 10 (Art. 11), while those in the columns headed *L. Cot* are correctly given.

25. Since  $\sec x = \frac{1}{\cos x}$ , and  $\operatorname{cosec} x = \frac{1}{\sin x}$ , the logarithms of the secant and cosecant of an angle are the arithmetical complements of those of the cosine and sine respectively (Art. 12).

*To find the Logarithmic Functions of an Angle Less than  $90^\circ$ .*

26. *When the angle is less than  $45^\circ$* , the degrees are found at the *top* of the page, and the minutes on the *left*. The numbers in the same horizontal line with the minutes of the angle are the logarithmic functions indicated by the notation at the *top* of the columns. Thus (page 428),

$$\begin{aligned}\log \sin 8^\circ 4' &= 9.14714 - 10, & \log \tan 8^\circ 4' &= 9.15145 - 10, \\ \log \cot 8^\circ 4' &= 0.84855, & \log \cos 8^\circ 4' &= 9.99568 - 10.\end{aligned}$$

27. *When the angle is greater than  $45^\circ$* , the degrees are found at the *bottom* of the page, and the minutes on the *right*. The numbers in the same horizontal line with the minutes of the angle are the logarithmic functions indicated by the notation at the *bottom* of the columns. Thus (page 428),

$$\begin{aligned}\log \sin 81^\circ 25' &= 9.99511 - 10, & \log \tan 81^\circ 25' &= 0.82120, \\ \log \cot 81^\circ 25' &= 9.17880 - 10, & \log \cos 81^\circ 25' &= 9.17391 - 10.\end{aligned}$$

28. *When the angle is given to decimals of a minute.*—In finding  $\log \sin 30^\circ 8'.48$ , for example, we see that it will lie between the logarithmic sines of  $30^\circ 8'$  and  $30^\circ 9'$ , that is, between 9.70072 and 9.70093, their difference 21 being the change in the logarithmic sine caused by a change of 1' in the angle. Hence, to find the correction to  $\log \sin 30^\circ 8'$  that would give  $\log \sin 30^\circ 8'.48$  we multiply 21 by .48 (Art. 4). The product 10.08 added to  $\log \sin 30^\circ 8'$ , since  $\log \sin 30^\circ 9'$  is greater than  $\log \sin 30^\circ 8'$ , gives  $\log \sin 30^\circ 8'.48 = 9.70082$  (Art. 1). Similarly,  $\log \tan 30^\circ 8'.48 = 9.76391$ ,  $\log \cot 30^\circ 8'.48 = 0.23609$ ,  $\log \cos 30^\circ 8'.48 = 9.93691$ , the correction being subtracted in the last two cases, since the cotangent and the cosine decrease as the angle increases.

29. *The general rule is: 'Find the function corresponding to the given degrees and minutes; multiply the tabular difference by the decimals of a minute; add the product to the function corresponding to the given degrees and minutes when finding the logarithmic sine or tangent, and subtract it when finding the logarithmic cosine or cotangent.*

*The tabular differences are given in the columns headed  $d.$  and  $c. d.$ , the latter containing the common difference for the  $L. Tan$  and  $L. Cot$  columns. The difference to be used is that between the functions corresponding to the two angles between which the given angle lies.*

For  $30^{\circ} 39'.38$ :  $\log \sin = 9.70747$ ;  $\log \cos = 9.93462$ ;  
 $\log \tan = 9.77285$ ;  $\log \cot = 0.22715$ .

For  $59^{\circ} 43'.46$ :  $\log \sin = 9.93632$ ;  $\log \cos = 9.70257$ ;  
 $\log \tan = 0.23375$ ;  $\log \cot = 9.76625$ .

30. *When the angle is given to seconds, the correction may be found by multiplying the tabular difference by the number of seconds, and dividing the product by 60.*

*To find the Acute Angle corresponding to a Given Logarithmic Function.*

31. The column headed  $L. Sin$  is marked  $L. Cos$  at the bottom, while that headed  $L. Cos$  is marked  $L. Sin$  at the bottom; hence, if a logarithmic sine or cosine were given, we should expect to find it in one of these two columns. Similarly, we should expect to find a given logarithmic tangent or cotangent in one of the two columns headed  $L. Tan$  and  $L. Cot$ .

32. *When the function can be found in the tables.*—If a logarithmic sine is given, find it in one of the two columns marked  $L. Sin$  and  $L. Cos$ ; if found in the column headed  $L. Sin$ , the degrees are taken from the top, and the minutes from the left of the page; if in the column headed  $L. Cos$  but marked  $L. Sin$  at the bottom, the degrees are taken from the bottom, and the minutes from the right of the page. Thus,

$9.70115 = \log \sin 30^{\circ} 10'$ ;  $9.93457 = \log \sin 59^{\circ} 20'$ ;  
 $9.93724 = \log \cos 30^{\circ} 4'$ ;  $9.70590 = \log \cos 59^{\circ} 28'$ ;  
 $9.76406 = \log \tan 30^{\circ} 9'$ ;  $0.23130 = \log \tan 59^{\circ} 35'$ ;  
 $0.23420 = \log \cot 30^{\circ} 15'$ ;  $9.76870 = \log \cot 59^{\circ} 35'$ .

33. *When the function can not be found in the tables.*—If we wish to find the angle whose logarithmic sine is  $9.70170$ , we see on page 450 that the given logarithmic sine lies between  $9.70159$  and  $9.70180$ , and



hence the angle is between  $30^{\circ} 12'$  and  $30^{\circ} 13'$ . The given logarithmic sine differs from  $\log \sin 30^{\circ} 12'$  by 11, and this difference, divided by the tabular difference 21, gives .52 + as the decimal of a minute by which the angle exceeds  $30^{\circ} 12'$ . Hence  $9.70170 = \log \sin 30^{\circ} 12'.52$ , which we call  $30^{\circ} 12'.5$ , since the incompleteness of the tables (Art. 1) makes the hundredths of a minute uncertain.

34. *The rule is: For a logarithmic sine or tangent find the degrees and minutes corresponding to the function in the tables next less than the given function; divide the difference between the given function and the one next less by the tabular difference; and the quotient will be the decimal of a minute to be added to the degrees and minutes already found. For a logarithmic cosine or cotangent find the degrees and minutes corresponding to the function next greater than the given function, since the cosine and cotangent decrease as the angle increases, and divide the difference between the given function and the one next greater by the tabular difference, to find the decimal of a minute.*

The tabular difference is the difference between the two functions in the tables, between which the given function lies.

$$\begin{aligned} 9.70000 &= \log \sin 30^{\circ} 4'.7; & 9.93500 &= \log \sin 59^{\circ} 25'.7; \\ 9.93400 &= \log \cos 30^{\circ} 47'.6; & 9.70500 &= \log \cos 59^{\circ} 32'.2; \\ 9.77000 &= \log \tan 30^{\circ} 29'.5; & 0.23200 &= \log \tan 59^{\circ} 37'.4; \\ 0.23300 &= \log \cot 30^{\circ} 19'.1; & 9.76400 &= \log \cot 59^{\circ} 51'.2. \end{aligned}$$

*Angles Near  $0^{\circ}$  or  $90^{\circ}$ .*

35. The assumption that the variations in the functions are proportional to the variations in the angles if the latter are less than  $1'$  fails when the angle is small, shown by the rapid changes in the tabular differences on pages 420, 421, and 422.

36. The quantities  $S'$  and  $T'$  which are used in this case are defined by the equations

$$\begin{aligned} S' &= \log \frac{\sin \alpha}{\alpha'}, \\ T' &= \log \frac{\tan \alpha}{\alpha'}, \end{aligned}$$

where  $\alpha'$  is the number of minutes in the angle. Their values from  $0^{\circ}$  to  $1^{\circ} 40'$  ( $=100'$ ) are given at the bottom of pages 397–415; from  $1^{\circ} 40'$  to  $3^{\circ} 20'$  at the left margin of pages 398 and 399, the first three figures being found at the top; and from  $3^{\circ}$  to  $5^{\circ}$  on page 418. Thus,

$$\begin{aligned} \text{for } 1' &= 1' \text{ (page 399), } S' = 6.46 \ 373, T' = 6.46 \ 373; \\ \text{for } 15' &= 15' \text{ (page 399), } S' = 6.46 \ 372, T' = 6.46 \ 373; \\ \text{for } 2^{\circ} 40' &= 160' \text{ (page 399), } S' = 6.46 \ 357, T' = 6.46 \ 404; \\ \text{for } 4^{\circ} 20' &= 260' \text{ (page 418), } S' = 6.46 \ 331, T' = 6.46 \ 456. \end{aligned}$$

Each of these numbers should have — 10 written after it (Art. 11).

NOTE. — The logarithmic cosine of a small angle is found by the ordinary method. The cotangent of an angle is the reciprocal of the tangent, and hence the logarithmic cotangent is the arithmetical complement of the logarithmic tangent. The formulas for finding the logarithmic cosine, tangent, and cotangent of angles near  $90^\circ$  are given on page 419.

37. *To find the logarithmic sine or tangent of a small angle.* — From Art. 36, we have

$$\log \sin \alpha = S' + \log a',$$

$$\log \tan \alpha = T' + \log a'.$$

Hence, to find the logarithmic sine or tangent of an angle less than  $5^\circ$ , find the value of the  $S'$  or  $T'$  corresponding to the angle, interpolating if necessary, and add it to the logarithm of the number of minutes in the angle.

Find  $\log \sin 0^\circ 42'.6$ . Since the angle is nearer  $43'$  than  $42'$ , we take

$$S' = 6.46\ 371$$

$$\log 42.6 = \underline{1.62\ 941}$$

$$\therefore \log \sin 0^\circ 42'.6 = 8.09\ 312$$

Find  $\log \tan 1^\circ 53'.2$ . Since the angle is nearer  $1^\circ 53'$  ( $= 113'$ ) than  $114'$ , we take

$$T' = 6.46\ 388$$

$$\log 113.2 = \underline{2.05\ 385}$$

$$\therefore \log \tan 1^\circ 53'.2 = 8.51\ 773$$

NOTE. — When the angle is given in seconds, either reduce the seconds to decimals of a minute, or use the values of  $S''$  and  $T''$  given at the bottom of pages 397–417 and on page 418. They are defined by the equations

$$S'' = \log \frac{\sin \alpha}{a''}, \text{ and } T'' = \log \frac{\tan \alpha}{a''},$$

where  $a''$  is the number of seconds in the angle. Hence

$$\log \sin \alpha = S'' + \log a'', \text{ and } \log \tan \alpha = T'' + \log a''.$$

38. *To find the small angle corresponding to a given logarithmic sine or tangent.* — From Art. 36,

$$\left. \begin{aligned} \log a' &= \log \sin \alpha - S', \\ \log a' &= \log \tan \alpha - T', \end{aligned} \right\}$$

or

$$\left. \begin{aligned} \log a' &= \log \sin \alpha + \text{cpl } S', \\ \log a' &= \log \tan \alpha + \text{cpl } T'. \end{aligned} \right\}$$

When the angle is less than  $3^\circ$ , find on pages 420–422 the value of  $\text{cpl } S'$  (or  $\text{cpl } T'$ ) corresponding to the function, interpolating if necessary, and add it to  $\log \sin \alpha$  (or  $\log \tan \alpha$ ); the sum will be the logarithm of the number of minutes in the angle.

In finding the angle whose logarithmic sine is 8.09006, we see from

the *L. Sin* column (page 420) that the angle is between  $0^\circ 42'$  and  $0^\circ 43'$ , and that the value of *cpl S'* must be either 3.53628 or 3.53629. The given logarithmic sine is nearer that of  $42'$  than that of  $43'$ ; hence we take

$$\begin{aligned}\text{cpl } S' &= 3.53628 \\ \log \sin \alpha &= 8.09006 \\ \log \alpha' &= 1.62634 \quad \therefore \alpha' = 42'.300.\end{aligned}$$

When the angle is between  $3^\circ$  and  $5^\circ$ , we may find  $S'$  and  $T'$  from page 418 after finding the angle approximately from pages 423 and 424. Thus in finding the angle whose logarithmic tangent is 8.77237 we find from page 423 that the angle is between  $3^\circ 23'$  and  $3^\circ 24'$ , being nearer  $3^\circ 23'$ . Then on page 418 we have

$$\begin{aligned}T' &= 6.46423 \\ \log \tan \alpha &= 8.77237 \\ \therefore \log \tan \alpha - T' &= \log \alpha' = 2.30814 \quad \therefore \alpha' = 203'.30 = 3^\circ 23'.30.\end{aligned}$$

### *Angles Greater than $90^\circ$ .*

39. To find the logarithmic sine, cosine, tangent, or cotangent of an angle greater than  $90^\circ$ , subtract from the given angle the largest multiple of  $90^\circ$  contained therein. If this multiple is even, find from the tables the logarithmic sine, cosine, tangent, or cotangent of the remaining acute angle. If the multiple is odd, the logarithmic *cosine*, *sine*, *cotangent*, or *tangent*, respectively, of the remaining acute angle will be the function required; thus,  $\sin 120^\circ = \sin (90^\circ + 30^\circ) = \cos 30^\circ$ .

$x =$	I. QUADRANT. $\alpha$	II. QUADRANT. $90^\circ +$	III. QUADRANT. $180^\circ + \alpha$	IV. QUADRANT. $270^\circ + \alpha$
$\sin x =$	$+\sin \alpha$	$+\cos \alpha$	$-\sin \alpha$	$-\cos \alpha$
$\cos x =$	$+\cos \alpha$	$-\sin \alpha$	$-\cos \alpha$	$+\sin \alpha$
$\tan x =$	$+\tan \alpha$	$-\cot \alpha$	$+\tan \alpha$	$-\cot \alpha$
$\cot x =$	$+\cot \alpha$	$-\tan \alpha$	$+\cot \alpha$	$-\tan \alpha$

Or we could find the difference between the angle and  $180^\circ$  or  $360^\circ$ , and find from the tables the same function of the remaining acute angle; thus,  $\cos 300^\circ = \cos (360^\circ - 60^\circ) = \cos 60^\circ$ , etc.

$x =$	I. QUADRANT. $\alpha$	II. QUADRANT. $180^\circ - \alpha$	III. QUADRANT. $180^\circ + \alpha$	IV. QUADRANT. $360^\circ - \alpha$ or $-\alpha$
$\sin x =$	$+\sin \alpha$	$+\sin \alpha$	$-\sin \alpha$	$-\sin \alpha$
$\cos x =$	$+\cos \alpha$	$-\cos \alpha$	$-\cos \alpha$	$+\cos \alpha$
$\tan x =$	$+\tan \alpha$	$-\tan \alpha$	$+\tan \alpha$	$-\tan \alpha$
$\cot x =$	$+\cot \alpha$	$-\cot \alpha$	$+\cot \alpha$	$-\cot \alpha$

To indicate that the trigonometric function is negative,  $n$  is written after its logarithm.

40. To find the angle corresponding to a given function, find the acute angle  $\alpha$  corresponding thereto, and the required angle will be  $\alpha$ ,  $180^\circ \pm \alpha$ , or  $360^\circ - \alpha$ , according to the quadrant in which the angle should be placed.

41. There are always two angles less than  $360^\circ$  corresponding to any given function. Hence there will be ambiguity in the result unless some condition is known that will fix the angle; thus, if the sine is positive, the angle may be in either of the first two quadrants, but if we also know that the cosine is negative, the angle must be in the second quadrant.

*Given One Function of an Angle, to find Another without finding the Angle.*

42. Suppose  $\log \tan \alpha = 9.79361$ , and  $\log \cos \alpha$  is sought. On page 451 the tabular difference for  $\log \tan \alpha$  is 28, and that for  $\log \cos \alpha$  is 8, the given logarithmic tangent exceeding 9.79354 by 7. Hence  $28:7=8:x$ ;  $\therefore x=2$  = correction to 9.92905, giving  $\log \cos \alpha = 9.92903$ .

In the margin are tables to facilitate the process. In the column headed  $\frac{8}{28}$ , the numerator is the tabular difference for the logarithmic cosines, and the denominator that for the logarithmic tangents<sup>1</sup>. The correction for the logarithmic cosine will be 0 when the given logarithmic tangent exceeds the next smaller logarithmic tangent, found in the tables, by less than 1.8, 1 for an excess between 1.8 and 5.2, 5 for an excess between 5.2 and 19.2, etc. In the example above, the excess was 7, which is between 5.2 and 8.8, so that the correction is 2.

For example, if we have given the logarithms of the sides of a right-angled triangle,  $\log a = 2.98227$  and  $\log b = 2.90255$ , to find the hypotenuse, we use the formulas

$$\tan \alpha = \frac{a}{b}, \text{ and } c = \frac{a}{\sin \alpha} = \frac{b}{\cos \alpha}.$$

$$\log a = 2.98227 \text{ (1)}$$

$$\therefore \log \sin \alpha = 9.88571 \text{ (4)}$$

$$\log b = 2.90255 \text{ (2)}$$

$$\therefore \log \tan \alpha = 0.07972 \text{ (3)}$$

$$\therefore \log c = 3.09656 \text{ (5)}$$

The value of  $\log \tan \alpha$  being found in the column marked *L. Tan* at the bottom, the right column will contain the logarithmic sine of the corresponding angle. Also, the correction to 9.88563 is  $20 \times \frac{1}{2} \frac{0}{8}$ , which we find to be 8 from the table headed  $\frac{1}{2} \frac{0}{8}$ .

<sup>1</sup> For angles  $< 45^\circ$ .



TABLE XV.  
COMMON  
LOGARITHMS OF NUMBERS

FROM 1 TO 11000.

N.	Log.	N.	Log.	N.	Log.	N.	Log.	N.	Log.
<b>0</b>	—	<b>20</b>	1.30 103	<b>40</b>	1.60 206	<b>60</b>	1.77 815	<b>80</b>	1.90 309
1	0.00 000	21	1.32 222	41	1.61 278	61	1.78 533	81	1.90 849
2	0.30 103	22	1.34 242	42	1.62 325	62	1.79 239	82	1.91 381
3	0.47 712	23	1.36 173	43	1.63 347	63	1.79 934	83	1.91 908
4	0.60 206	24	1.38 021	44	1.64 345	64	1.80 618	84	1.92 428
5	0.69 897	25	1.39 794	45	1.65 321	65	1.81 291	85	1.92 942
6	0.77 815	26	1.41 497	46	1.66 276	66	1.81 954	86	1.93 450
7	0.84 510	27	1.43 136	47	1.67 210	67	1.82 607	87	1.93 952
8	0.90 309	28	1.44 716	48	1.68 124	68	1.83 251	88	1.94 448
9	0.95 424	29	1.46 240	49	1.69 020	69	1.83 885	89	1.94 939
<b>10</b>	1.00 000	<b>30</b>	1.47 712	<b>50</b>	1.69 897	<b>70</b>	1.84 510	<b>90</b>	1.95 424
11	1.04 139	31	1.49 136	51	1.70 757	71	1.85 126	91	1.95 904
12	1.07 918	32	1.50 515	52	1.71 600	72	1.85 733	92	1.96 379
13	1.11 394	33	1.51 851	53	1.72 428	73	1.86 332	93	1.96 848
14	1.14 613	34	1.53 148	54	1.73 239	74	1.86 923	94	1.97 313
15	1.17 609	35	1.54 407	55	1.74 036	75	1.87 506	95	1.97 772
16	1.20 412	36	1.55 630	56	1.74 819	76	1.88 081	96	1.98 227
17	1.23 045	37	1.56 820	57	1.75 587	77	1.88 649	97	1.98 677
18	1.25 527	38	1.57 978	58	1.76 343	78	1.89 209	98	1.99 123
19	1.27 875	39	1.59 106	59	1.77 085	79	1.89 763	99	1.99 564
<b>20</b>	1.30 103	<b>40</b>	1.60 206	<b>60</b>	1.77 815	<b>80</b>	1.90 309	<b>100</b>	2.00 000

S'.			T'.		S''.			T''.	
0'	6.46	373	373		0°	0' =	4.68	557	557
1		373	373		0	1 =	557		557
					0	2 =	557		557

S'. T'. 6.46	N.	L. 0	1	2	3	4	5	6	7	8	9	P. P.
366 385	100	00 000	043	087	130	173	217	260	303	346	389	44 43 42
366 385	101	432	475	518	561	604	647	689	732	775	817	1 4.4 4.3 4.2
366 385	102	860	903	945	988	*030	*072	*115	*157	*199	*242	2 8.8 8.6 8.4
366 386	103	01 284	326	368	410	452	494	536	578	620	662	3 13.2 12.9 12.6
366 386	104	703	745	787	828	870	912	953	995	*036	*078	4 17.6 17.2 16.8
366 386	105	02 119	160	202	243	284	325	366	407	449	490	5 22.0 21.5 21.0
366 386	106	531	572	612	653	694	735	776	816	857	898	6 26.4 25.8 25.2
366 387	107	938	979	*019	*060	*100	*141	*181	*222	*262	*302	7 30.8 30.1 29.4
365 387	108	03 342	383	423	463	503	543	583	623	663	703	8 35.2 34.4 33.6
365 387	109	743	782	822	862	902	941	981	*021	*060	*100	9 39.6 38.7 37.8
365 387	110	04 139	179	218	258	297	336	376	415	454	493	41 40 39
365 388	111	532	571	610	650	689	727	766	805	844	883	1 4.1 4.0 3.9
365 388	112	922	961	999	*038	*077	*115	*154	*192	*231	*269	2 8.2 8.0 7.8
365 388	113	05 308	346	385	423	461	500	538	576	614	652	3 12.3 12.0 11.7
365 389	114	690	729	767	805	843	881	918	956	994	*032	4 16.4 16.0 15.6
365 389	115	06 070	108	145	183	221	258	296	333	371	408	5 20.5 20.0 19.5
364 389	116	446	483	521	558	595	633	670	707	744	781	6 24.6 24.0 23.4
364 389	117	819	856	893	930	967	*004	*041	*078	*115	*151	7 28.7 28.0 27.3
364 390	118	07 188	225	262	298	335	372	408	445	482	518	8 32.8 32.0 31.2
364 390	119	555	591	628	664	700	737	773	809	846	882	9 36.9 36.0 35.1
364 390	120	918	954	990	*027	*063	*099	*135	*171	*207	*243	38 37 36
364 391	121	08 279	314	350	386	422	458	493	529	565	600	1 3.8 3.7 3.6
363 391	122	636	672	707	743	778	814	849	884	920	955	2 7.6 7.4 7.2
363 391	123	991	*026	*061	*096	*132	*167	*202	*237	*272	*307	3 11.4 11.1 10.8
363 391	124	09 342	377	412	447	482	517	552	587	621	656	4 15.2 14.8 14.4
363 392	125	691	726	760	795	830	864	899	934	968	*003	5 19.0 18.5 18.0
363 392	126	10 037	072	106	140	175	209	243	278	312	346	6 22.8 22.2 21.6
363 392	127	380	415	449	483	517	551	585	619	653	687	7 26.6 25.9 25.2
363 393	128	721	755	789	823	857	890	924	958	992	*025	8 30.4 29.6 28.8
362 393	129	11 059	093	126	160	193	227	261	294	327	361	9 34.2 33.3 32.4
362 393	130	394	428	461	494	528	561	594	628	661	694	35 34 33
362 394	131	727	760	793	826	860	893	926	959	992	*024	1 3.5 3.4 3.3
362 394	132	12 057	090	123	156	189	222	254	287	320	352	2 7.0 6.8 6.6
362 394	133	385	418	450	483	516	548	581	613	646	678	3 10.5 10.2 9.9
362 395	134	710	743	775	808	840	872	905	937	969	*001	4 14.0 13.6 13.2
361 395	135	13 033	066	098	130	162	194	226	258	290	322	5 17.5 17.0 16.5
361 395	136	354	386	418	450	481	513	545	577	609	640	6 21.0 20.4 19.8
361 396	137	672	704	735	767	799	830	862	893	925	956	7 24.5 23.8 23.1
361 396	138	988	*019	*051	*082	*114	*145	*176	*208	*239	*270	8 28.0 27.2 26.4
361 396	139	14 301	333	364	395	426	457	489	520	551	582	9 31.5 30.6 29.7
361 397	140	613	644	675	706	737	768	799	829	860	891	32 31 30
360 397	141	922	953	983	*014	*045	*076	*106	*137	*168	*198	1 3.2 3.1 3.0
360 397	142	15 229	259	290	320	351	381	412	442	473	503	2 6.4 6.2 6.0
360 398	143	534	564	594	625	655	685	715	746	776	806	3 9.6 9.3 9.0
360 398	144	836	866	897	927	957	987	*017	*047	*077	*107	4 12.8 12.4 12.0
360 398	145	16 137	167	197	227	256	286	316	346	376	406	5 16.0 15.5 15.0
360 399	146	435	465	495	524	554	584	613	643	673	702	6 19.2 18.6 18.0
359 399	147	732	761	791	820	850	879	909	938	967	997	7 22.4 21.7 21.0
359 399	148	17 026	056	085	114	143	173	202	231	260	289	8 25.6 24.8 24.0
359 400	149	319	348	377	406	435	464	493	522	551	580	9 28.8 27.9 27.0
359 400	150	609	638	667	696	725	754	782	811	840	869	
S'. T'. 6.46	N.	L. 0	1	2	3	4	5	6	7	8	9	P. P.
1' 6.46 373 373			0°	1' = 60''	4.68	557	557		0°	19' = 1140''	4.68	557 558
2 373 373			0	2 = 120		557	557		0	20 = 1200		557 558
10 373 373			0	3 = 180		557	557		0	21 = 1260		557 558
13 373 373			0	16 = 960		557	558		0	22 = 1320		557 558
14 372 373			0	17 = 1020		557	558		0	23 = 1380		557 558
15 372 373			0	18 = 1080		557	558		0	24 = 1440		557 558
			0	19 = 1140		557	558		0	25 = 1500		557 558



S.	T.	N.	L. 0	1	2	3	4	5	6	7	8	9	P. P.	
359	400	150	17 609	638	667	696	725	754	782	811	840	869	29	28
359	401	151	898	926	955	984	*013	*041	*070	*099	*127	*156	1	2.9 2.8
358	401	152	18 184	213	241	270	298	327	355	384	412	441	2	5.8 5.6
358	401	153	469	498	526	554	583	611	639	667	696	724	3	8.7 8.4
358	402	154	752	780	808	837	865	893	921	949	977	*005	4	11.6 11.2
358	402	155	19 033	061	089	117	145	173	201	229	257	285	5	14.5 14.0
358	402	156	312	340	368	396	424	451	479	507	535	562	6	17.4 16.8
358	403	157	590	618	645	673	700	728	756	783	811	838	7	20.3 19.6
357	403	158	866	893	921	948	976	*003	*030	*058	*085	*112	8	23.2 22.4
357	404	159	20 140	167	194	222	249	276	303	330	358	385	9	26.1 25.2
357	404	160	412	439	466	493	520	548	575	602	629	656	27	26
357	404	161	683	710	737	763	790	817	844	871	898	925	1	2.7 2.6
357	405	162	952	978	*005	*032	*059	*085	*112	*139	*165	*192	2	5.4 5.2
356	405	163	21 219	245	272	299	325	352	378	405	431	458	3	8.1 7.8
356	406	164	484	511	537	564	590	617	643	669	696	722	4	10.8 10.4
356	406	165	748	775	801	827	854	880	906	932	958	985	5	13.5 13.0
356	406	166	22 011	037	063	089	115	141	167	194	220	246	6	16.2 15.6
356	407	167	272	298	324	350	376	401	427	453	479	505	7	18.9 18.2
355	407	168	531	557	583	608	634	660	686	712	737	763	8	21.6 20.8
355	408	169	789	814	840	866	891	917	943	968	994	*019	9	24.3 23.4
355	408	170	23 045	070	096	121	147	172	198	223	249	274	25	
355	408	171	300	325	350	376	401	426	452	477	502	528	1	2.5
354	409	172	553	578	603	629	654	679	704	729	754	779	2	5.0
354	409	173	805	830	855	880	905	930	955	980	*005	*030	3	7.5
354	410	174	24 055	080	105	130	155	180	204	229	254	279	4	10.0
354	410	175	304	329	353	378	403	428	452	477	502	527	5	12.5
354	411	176	551	576	601	625	650	674	699	724	748	773	6	15.0
353	411	177	797	822	846	871	895	920	944	969	993	*018	7	17.5
353	411	178	25 042	066	091	115	139	164	188	212	237	261	8	20.0
353	412	179	285	310	334	358	382	406	431	455	479	503	9	22.5
353	412	180	527	551	575	600	624	648	672	696	720	744	24	23
353	413	181	768	792	816	840	864	888	912	935	959	983	1	2.4 2.3
352	413	182	26 007	031	055	079	102	126	150	174	198	221	2	4.8 4.6
352	414	183	245	269	293	316	340	364	387	411	435	458	3	7.2 6.9
352	414	184	482	505	529	553	576	600	623	647	670	694	4	9.6 9.2
352	415	185	717	741	764	788	811	834	858	881	905	928	5	12.0 11.5
351	415	186	951	975	998	*021	*045	*068	*091	*114	*138	*161	6	14.4 13.8
351	415	187	27 184	207	231	254	277	300	323	346	370	393	7	16.8 16.1
351	416	188	416	439	462	485	508	531	554	577	600	623	8	19.2 18.4
351	416	189	646	669	692	715	738	761	784	807	830	852	9	21.6 20.7
350	417	190	875	898	921	944	967	989	*012	*035	*058	*081	22	21
350	417	191	28 103	126	149	171	194	217	240	262	285	307	1	2.2 2.1
350	418	192	330	353	375	398	421	443	466	488	511	533	2	4.4 4.2
350	418	193	556	578	601	623	646	668	691	713	735	758	3	6.6 6.3
350	419	194	780	803	825	847	870	892	914	937	959	981	4	8.8 8.4
349	419	195	29 003	026	048	070	092	115	137	159	181	203	5	11.0 10.5
349	420	196	226	248	270	292	314	336	358	380	403	425	6	13.2 12.6
349	420	197	447	469	491	513	535	557	579	601	623	645	7	15.4 14.7
349	421	198	667	688	710	732	754	776	798	820	842	863	8	17.6 16.8
348	421	199	885	907	929	951	973	994	*016	*038	*060	*081	9	19.8 18.9
348	422	200	30 103	125	146	168	190	211	233	255	276	298		
		N.	L. 0	1	2	3	4	5	6	7	8	9	P. P.	
S.		T.											S.	T.
1'	6.46	373	373	0°	2' = 120"	4.68	557	557	0°	28' = 1680"	4.68	557	558	
2		373	373	0	3 = 180		557	557	0	29 = 1740		557	559	
15		372	373	0	4 = 240		557	558	0	30 = 1800		557	559	
20		372	373	0	25 = 1500		557	558	0	31 = 1860		557	559	
				0	26 = 1560		557	558	0	32 = 1920		557	559	
				0	27 = 1620		557	558	0	33 = 1980		557	559	
				0	28 = 1680		557	558	0	34 = 2040		557	559	

N.	L.	0	1	2	3	4	5	6	7	8	9	P. P.	
200	30	103	125	146	168	190	211	233	255	276	298		22 21
201		320	341	363	384	406	428	449	471	492	514	1	2.2 2.1
202		535	557	578	600	621	643	664	685	707	728	2	4.4 4.2
203		750	771	792	814	835	856	878	899	920	942	3	6.6 6.3
204		963	984	*006	*027	*048	*069	*091	*112	*133	*154	4	8.8 8.4
205	31	175	197	218	239	260	281	302	323	345	366	5	11.0 10.5
206		387	408	429	450	471	492	513	534	555	576	6	13.2 12.6
207		597	618	639	660	681	702	723	744	765	785	7	15.4 14.7
208		806	827	848	869	890	911	931	952	973	994	8	17.6 16.8
209	32	015	035	056	077	098	118	139	160	181	201	9	19.8 18.9
210		222	243	263	284	305	325	346	366	387	408		20
211		428	449	469	490	510	531	552	572	593	613	1	2.0
212		634	654	675	695	715	736	756	777	797	818	2	4.0
213		838	858	879	899	919	940	960	980	*001	*021	3	6.0
214	33	041	062	082	102	122	143	163	183	203	224	4	8.0
215		244	264	284	304	325	345	365	385	405	425	5	10.0
216		445	465	486	506	526	546	566	586	606	626	6	12.0
217		646	666	686	706	726	746	766	786	806	826	7	14.0
218		846	866	885	905	925	945	965	985	*005	*025	8	16.0
219	34	044	064	084	104	124	143	163	183	203	223	9	18.0
220		242	262	282	301	321	341	361	380	400	420		19
221		439	459	479	498	518	537	557	577	596	616	1	1.9
222		635	655	674	694	713	733	753	772	792	811	2	3.8
223		830	850	869	889	908	928	947	967	986	*005	3	5.7
224	35	025	044	064	083	102	122	141	160	180	199	4	7.6
225		218	238	257	276	295	315	334	353	372	392	5	9.5
226		411	430	449	468	488	507	526	545	564	583	6	11.4
227		603	622	641	660	679	698	717	736	755	774	7	13.3
228		793	813	832	851	870	889	908	927	946	965	8	15.2
229		984	*003	*021	*040	*059	*078	*097	*116	*135	*154	9	17.1
230	36	173	192	211	229	248	267	286	305	324	342		18
231		361	380	399	418	436	455	474	493	511	530	1	1.8
232		549	568	586	605	624	642	661	680	698	717	2	3.6
233		736	754	773	791	810	829	847	866	884	903	3	5.4
234		922	940	959	977	996	*014	*033	*051	*070	*088	4	7.2
235	37	107	125	144	162	181	199	218	236	254	273	5	9.0
236		291	310	328	346	365	383	401	420	438	457	6	10.8
237		475	493	511	530	548	566	585	603	621	639	7	12.6
238		658	676	694	712	731	749	767	785	803	822	8	14.4
239		840	858	876	894	912	931	949	967	985	*003	9	16.2
240	38	021	039	057	075	093	112	130	148	166	184		17
241		202	220	238	256	274	292	310	328	346	364	1	1.7
242		382	399	417	435	453	471	489	507	525	543	2	3.4
243		561	578	596	614	632	650	668	686	703	721	3	5.1
244		739	757	775	792	810	828	846	863	881	899	4	6.8
245		917	934	952	970	987	*005	*023	*041	*058	*076	5	8.5
246	39	094	111	129	146	164	182	199	217	235	252	6	10.2
247		270	287	305	322	340	358	375	393	410	428	7	11.9
248		445	463	480	498	515	533	550	568	585	602	8	13.6
249		620	637	655	672	690	707	724	742	759	777	9	15.3
250		794	811	829	846	863	881	898	915	933	950		
N.	L.	0	1	2	3	4	5	6	7	8	9	P. P.	
	S.	T.					S.	T.				S.	T.
2'	6.46	373	373	0°	3' = 180''	4.68	557	557	0°	36' = 2160''	4.68	557	559
3		373	373	0	4 = 240		557	558	0	37 = 2220		557	559
20		372	373	0	5 = 300		557	558	0	38 = 2280		557	559
25		372	373	0	33 = 1980		557	559	0	39 = 2340		557	559
				0	34 = 2040		557	559	0	40 = 2400		557	559
				0	35 = 2100		557	559	0	41 = 2460		556	560
				0	36 = 2160		557	559	0	42 = 2520		556	560

N.	L.	0	1	2	3	4	5	6	7	8	9	P. P.	
250	39	794	811	829	846	863	881	898	915	933	950	18	
251		967	985	*002	*019	*037	*054	*071	*088	*106	*123	1	1.8
252	40	140	157	175	192	209	226	243	261	278	295	2	3.6
253		312	329	346	364	381	398	415	432	449	466	3	5.4
254		483	500	518	535	552	569	586	603	620	637	4	7.2
255		654	671	688	705	722	739	756	773	790	807	5	9.0
256		824	841	858	875	892	909	926	943	960	976	6	10.8
257		993	*010	*027	*044	*061	*078	*095	*111	*128	*145	7	12.6
258	41	162	179	196	212	229	246	263	280	296	313	8	14.4
259		330	347	363	380	397	414	430	447	464	481	9	16.2
260		497	514	531	547	564	581	597	614	631	647	17	
261		664	681	697	714	731	747	764	780	797	814	1	1.7
262		830	847	863	880	896	913	929	946	963	979	2	3.4
263		996	*012	*029	*045	*062	*078	*095	*111	*127	*144	3	5.1
264	42	160	177	193	210	226	243	259	275	292	308	4	6.8
265		325	341	357	374	390	406	423	439	455	472	5	8.5
266		488	504	521	537	553	570	586	602	619	635	6	10.2
267		651	667	684	700	716	732	749	765	781	797	7	11.9
268		815	830	846	862	878	894	911	927	943	959	8	13.6
269		975	991	*008	*024	*040	*056	*072	*088	*104	*120	9	15.3
270	43	136	152	169	185	201	217	233	249	265	281	16	
271		297	313	329	345	361	377	393	409	425	441	1	1.6
272		457	473	489	505	521	537	553	569	584	600	2	3.2
273		616	632	648	664	680	696	712	727	743	759	3	4.8
274		775	791	807	823	838	854	870	886	902	917	4	6.4
275		933	949	965	981	996	*012	*028	*044	*059	*075	5	8.0
276	44	091	107	122	138	154	170	185	201	217	232	6	9.6
277		248	264	279	295	311	326	342	358	373	389	7	11.2
278		404	420	436	451	467	483	498	514	529	545	8	12.8
279		560	576	592	607	623	638	654	669	685	700	9	14.4
280		716	731	747	762	778	793	809	824	840	855	15	
281		871	886	902	917	932	948	963	979	994	*010	1	1.5
282	45	025	040	056	071	086	102	117	133	148	163	2	3.0
283		179	194	209	225	240	255	271	286	301	317	3	4.5
284		332	347	362	378	393	408	423	439	454	469	4	6.0
285		484	500	515	530	545	561	576	591	606	621	5	7.5
286		637	652	667	682	697	712	728	743	758	773	6	9.0
287		788	803	818	834	849	864	879	894	909	924	7	10.5
288		939	954	969	984	*000	*015	*030	*045	*060	*075	8	12.0
289	46	090	105	120	135	150	165	180	195	210	225	9	13.5
290		240	255	270	285	300	315	330	345	359	374	14	
291		389	404	419	434	449	464	479	494	509	523	1	1.4
292		538	553	568	583	598	613	627	642	657	672	2	2.8
293		687	702	716	731	746	761	776	790	805	820	3	4.2
294		835	850	864	879	894	909	923	938	953	967	4	5.6
295		982	997	*012	*026	*041	*056	*070	*085	*100	*114	5	7.0
296	47	129	144	159	173	188	202	217	232	246	261	6	8.4
297		276	290	305	319	334	349	363	378	392	407	7	9.8
298		422	436	451	465	480	494	509	524	538	553	8	11.2
299		567	582	596	611	625	640	654	669	683	698	9	12.6
300		712	727	741	756	770	784	799	813	828	842		
N.	L.	0	1	2	3	4	5	6	7	8	9	P. P.	
		S.	T.				S.	T.				S.	T.
2'	6.46	373	373	0° 4' =	240"	4.68	557	558	0° 45' =	2700"	4.68	556	560
3		373	373	0 5 =	300		557	558	0 46 =	2760		556	560
25		372	373	0 41 =	2460		556	560	0 47 =	2820		556	560
26		372	373	0 42 =	2520		556	560	0 48 =	2880		556	560
27		372	374	0 43 =	2580		556	560	0 49 =	2940		556	560
30		372	374	0 44 =	2640		556	560	0 50 =	3000		556	561
				0 45 =	2700		556	560					



N.	L.	0	1	2	3	4	5	6	7	8	9	P. P.		
300	47	712	727	741	756	770	784	799	813	828	842			
301		857	871	885	900	914	929	943	958	972	986			
302	48	001	015	029	044	058	073	087	101	116	130			
303		144	159	173	187	202	216	230	244	259	273	15		
304		287	302	316	330	344	359	373	387	401	416	1	1.5	
305		430	444	458	473	487	501	515	530	544	558	2	3.0	
306		572	586	601	615	629	643	657	671	686	700	3	4.5	
307		714	728	742	756	770	785	799	813	827	841	4	6.0	
308		855	869	883	897	911	926	940	954	968	982	5	7.5	
309		996	*010	*024	*038	*052	*066	*080	*094	*108	*122	6	9.0	
310	49	136	150	164	178	192	206	220	234	248	262	7	10.5	
311		276	290	304	318	332	346	360	374	388	402	8	12.0	
312		415	429	443	457	471	485	499	513	527	541	9	13.5	
313		554	568	582	596	610	624	638	651	665	679			
314		693	707	721	734	748	762	776	790	803	817	14		
315		831	845	859	872	886	900	914	927	941	955			
316		969	982	996	*010	*024	*037	*051	*065	*079	*092	1	1.4	
317	50	106	120	133	147	161	174	188	202	215	229	2	2.8	
318		243	256	270	284	297	311	325	338	352	365	3	4.2	
319		379	393	406	420	433	447	461	474	488	501	4	5.6	
320		515	529	542	556	569	583	596	610	623	637	5	7.0	
321		651	664	678	691	705	718	732	745	759	772	6	8.4	
322		786	799	813	826	840	853	866	880	893	907	7	9.8	
323		920	934	947	961	974	987	*001	*014	*028	*041	8	11.2	
324	51	055	068	081	095	108	121	135	148	162	175	9	12.6	
325		188	202	215	228	242	255	268	282	295	308			
326		322	335	348	362	375	388	402	415	428	441	13		
327		455	468	481	495	508	521	534	548	561	574			
328		587	601	614	627	640	654	667	680	693	706	1	1.3	
329		720	733	746	759	772	786	799	812	825	838	2	2.6	
330		851	865	878	891	904	917	930	943	957	970	3	3.9	
331		983	996	*009	*022	*035	*048	*061	*075	*088	*101	4	5.2	
332	52	114	127	140	153	166	179	192	205	218	231	5	6.5	
333		244	257	270	284	297	310	323	336	349	362	6	7.8	
334		375	388	401	414	427	440	453	466	479	492	7	9.1	
335		504	517	530	543	556	569	582	595	608	621	8	10.4	
336		634	647	660	673	686	699	711	724	737	750	9	11.7	
337		763	776	789	802	815	827	840	853	866	879			
338		892	905	917	930	943	956	969	982	994	*007			
339	53	020	033	046	058	071	084	097	110	122	135	12		
340		148	161	173	186	199	212	224	237	250	263	1	1.2	
341		275	288	301	314	326	339	352	364	377	390	2	2.4	
342		403	415	428	441	453	466	479	491	504	517	3	3.6	
343		529	542	555	567	580	593	605	618	631	643	4	4.8	
344		656	668	681	694	706	719	732	744	757	769	5	6.0	
345		782	794	807	820	832	845	857	870	882	895	6	7.2	
346		908	920	933	945	958	970	983	995	*008	*020	7	8.4	
347	54	033	045	058	070	083	095	108	120	133	145	8	9.6	
348		158	170	183	195	208	220	233	245	258	270	9	10.8	
349		283	295	307	320	332	345	357	370	382	394			
350		407	419	432	444	456	469	481	494	506	518			
N.	L.	0	1	2	3	4	5	6	7	8	9	P. P.		
		S.	T.					S.	T.					
3'	6.46	373	373	0° 5' = 300"				4.68	557	558	0° 54' = 3240"			
4		373	373	0 6 = 360					557	558	4.68 556 561			
30		372	374	0 50 = 3000					556	561	556 561			
35		372	374	0 51 = 3060					556	561	555 561			
		0 52 = 3120				556 561				0 57 = 3420				
		0 53 = 3180				556 561				0 58 = 3480				
		0 54 = 3240				556 561				0 59 = 3540				

N.	L.	0	1	2	3	4	5	6	7	8	9	P. P.	
350	54	407	419	432	444	456	469	481	494	506	518		
351		531	543	555	568	580	593	605	617	630	642		
352		654	667	679	691	704	716	728	741	753	765	13	
353		777	790	802	814	827	839	851	864	876	888	1	
354		900	913	925	937	949	962	974	986	998	*011	2	
355	55	023	035	047	060	072	084	096	108	121	133	3	
356		145	157	169	182	194	206	218	230	242	255	4	
357		267	279	291	303	315	328	340	352	364	376	5	
358		388	400	413	425	437	449	461	473	485	497	6	
359		509	522	534	546	558	570	582	594	606	618	7	
360		630	642	654	666	678	691	703	715	727	739	8	
361		751	763	775	787	799	811	823	835	847	859	9	
362		871	883	895	907	919	931	943	955	967	979	11.7	
363		991	*003	*015	*027	*038	*050	*062	*074	*086	*098		
364	56	110	122	134	146	158	170	182	194	205	217	12	
365		229	241	253	265	277	289	301	312	324	336	1	
366		348	360	372	384	396	407	419	431	443	455	2	
367		467	478	490	502	514	526	538	549	561	573	3	
368		585	597	608	620	632	644	656	667	679	691	4	
369		703	714	726	738	750	761	773	785	797	808	5	
370		820	832	844	855	867	879	891	902	914	926	6	
371		937	949	961	972	984	996	*008	*019	*031	*043	7	
372	57	054	066	078	089	101	113	124	136	148	159	8	
373		171	183	194	206	217	229	241	252	264	276	9	
374		287	299	310	322	334	345	357	368	380	392		
375		403	415	426	438	449	461	473	484	496	507		
376		519	530	542	553	565	576	588	600	611	623		
377		634	646	657	669	680	692	703	715	726	738	11	
378		749	761	772	784	795	807	818	830	841	852	1	
379		864	875	887	898	910	921	933	944	955	967	2	
380		978	990	*001	*013	*024	*035	*047	*058	*070	*081	3	
381	58	092	104	115	127	138	149	161	172	184	195	4	
382		206	218	229	240	252	263	274	286	297	309	5	
383		320	331	343	354	365	377	388	399	410	422	6	
384		433	444	456	467	478	490	501	512	524	535	7	
385		546	557	569	580	591	602	614	625	636	647	8	
386		659	670	681	692	704	715	726	737	749	760	9	
387		771	782	794	805	816	827	838	850	861	872		
388		883	894	906	917	928	939	950	961	973	984		
389		995	*006	*017	*028	*040	*051	*062	*073	*084	*095	10	
390	59	106	118	129	140	151	162	173	184	195	207	1	
391		218	229	240	251	262	273	284	295	306	318	2	
392		329	340	351	362	373	384	395	406	417	428	3	
393		439	450	461	472	483	494	506	517	528	539	4	
394		550	561	572	583	594	605	616	627	638	649	5	
395		660	671	682	693	704	715	726	737	748	759	6	
396		770	780	791	802	813	824	835	846	857	868	7	
397		879	890	901	912	923	934	945	956	966	977	8	
398		988	999	*010	*021	*032	*043	*054	*065	*076	*086	9	
399	60	097	108	119	130	141	152	163	173	184	195		
400		206	217	228	239	249	260	271	282	293	304		
N.	L.	0	1	2	3	4	5	6	7	8	9	P. P.	
		S.' T.'					S." T."					S." T."	
3'	6.46	373	373	0°	5' = 300"	4.68	557	558	1°	1' = 3660"	4.68	555	562
4		373	373	0	6 = 360		557	558	I	2 = 3720		555	562
				0	7 = 420		557	558	I	3 = 3780		555	562
35		372	374	0	58 = 3480		555	562	I	4 = 3840		555	563
39		372	374	0	59 = 3540		555	562	I	5 = 3900		555	563
40		372	375	I	0 = 3600		555	562	I	6 = 3960		555	563
				I	1 = 3660		555	562	I	7 = 4020		555	563

N.	L.	0	1	2	3	4	5	6	7	8	9	P. P.
400	60	206	217	228	239	249	260	271	282	293	304	
401		314	325	336	347	358	369	379	390	401	412	
402		423	433	444	455	466	477	487	498	509	520	
403		531	541	552	563	574	584	595	606	617	627	
404		638	649	660	670	681	692	703	713	724	735	
405		746	756	767	778	788	799	810	821	831	842	
406		853	863	874	885	895	906	917	927	938	949	11
407		959	970	981	991	*002	*013	*023	*034	*045	*055	I   I.1
408	61	066	077	087	098	109	119	130	140	151	162	2   2.2
409		172	183	194	204	215	225	236	247	257	268	3   3.3
410		278	289	300	310	321	331	342	352	363	374	4   4.4
411		384	395	405	416	426	437	448	458	469	479	5   5.5
412		490	500	511	521	532	542	553	563	574	584	6   6.6
413		595	606	616	627	637	648	658	669	679	690	7   7.7
414		700	711	721	731	742	752	763	773	784	794	8   8.8
415		805	815	826	836	847	857	868	878	888	899	9   9.9
416		909	920	930	941	951	962	972	982	993	*003	
417	62	014	024	034	045	055	066	076	086	097	107	
418		118	128	138	149	159	170	180	190	201	211	
419		221	232	242	252	263	273	284	294	304	315	
420		325	335	346	356	366	377	387	397	408	418	10
421		428	439	449	459	469	480	490	500	511	521	I   1.0
422		531	542	552	562	572	583	593	603	613	624	2   2.0
423		634	644	655	665	675	685	696	706	716	726	3   3.0
424		737	747	757	767	778	788	798	808	818	829	4   4.0
425		839	849	859	870	880	890	900	910	921	931	5   5.0
426		941	951	961	972	982	992	*002	*012	*022	*033	6   6.0
427	63	043	053	063	073	083	094	104	114	124	134	7   7.0
428		144	155	165	175	185	195	205	215	225	236	8   8.0
429		246	256	266	276	286	296	306	317	327	337	9   9.0
430		347	357	367	377	387	397	407	417	428	438	
431		448	458	468	478	488	498	508	518	528	538	
432		548	558	568	579	589	599	609	619	629	639	
433		649	659	669	679	689	699	709	719	729	739	
434		749	759	769	779	789	799	809	819	829	839	
435		849	859	869	879	889	899	909	919	929	939	
436		949	959	969	979	988	998	*008	*018	*028	*038	9
437	64	048	058	068	078	088	098	108	118	128	137	I   0.9
438		147	157	167	177	187	197	207	217	227	237	2   1.8
439		246	256	266	276	286	296	306	316	326	335	3   2.7
440		345	355	365	375	385	395	404	414	424	434	4   3.6
441		444	454	464	473	483	493	503	513	523	532	5   4.5
442		542	552	562	572	582	591	601	611	621	631	6   5.4
443		640	650	660	670	680	689	699	709	719	729	7   6.3
444		738	748	758	768	777	787	797	807	816	826	8   7.2
445		836	846	856	865	875	885	895	904	914	924	9   8.1
446		933	943	953	963	972	982	992	*002	*011	*021	
447	65	031	040	050	060	070	079	089	099	108	118	
448		128	137	147	157	167	176	186	196	205	215	
449		225	234	244	254	263	273	283	292	302	312	
450		321	331	341	350	360	369	379	389	398	408	
N.	L.	0	1	2	3	4	5	6	7	8	9	P. P.
		S.' T.'					S." T."					S." T."
4'	6.46	373	373	0°	6' = 360"	4.68	557	558	1°	9' = 4140"	4.68	555 563
5		373	373	0	7 = 420		557	558	I	10 = 4200		554 563
40		372	375	0	8 = 480		557	558	I	11 = 4260		554 564
42		372	375	I	6 = 3960		555	563	I	12 = 4320		554 564
43		371	375	I	7 = 4020		555	563	I	13 = 4380		554 564
44		371	375	I	8 = 4080		555	563	I	14 = 4440		554 564
45		371	375	I	9 = 4140		555	563	I	15 = 4500		554 564



N.	L.	0	1	2	3	4	5	6	7	8	9	P. P.	
450	65	321	331	341	350	360	369	379	389	398	408		
451		418	427	437	447	456	466	475	485	495	504		
452		514	523	533	543	552	562	571	581	591	600		
453		610	619	629	639	648	658	667	677	686	696		
454		706	715	725	734	744	753	763	772	782	792		
455		801	811	820	830	839	849	858	868	877	887		
456		896	906	916	925	935	944	954	963	973	982	10	
457		992	*001	*011	*020	*030	*039	*049	*058	*068	*077	1	
458	66	087	096	106	115	124	134	143	153	162	172	2	
459		181	191	200	210	219	229	238	247	257	266	3	
460		276	285	295	304	314	323	332	342	351	361	4	
461		370	380	389	398	408	417	427	436	445	455	5	
462		464	474	483	492	502	511	521	530	539	549	6	
463		558	567	577	586	596	605	614	624	633	642	7	
464		652	661	671	680	689	699	708	717	727	736	8	
465		745	755	764	773	783	792	801	811	820	829	9	
466		839	848	857	867	876	885	894	904	913	922		
467		932	941	950	960	969	978	987	997	*006	*015		
468	67	025	034	043	052	062	071	080	089	099	108		
469		117	127	136	145	154	164	173	182	191	201		
470		210	219	228	237	247	256	265	274	284	293	9	
471		302	311	321	330	339	348	357	367	376	385	1	
472		394	403	413	422	431	440	449	459	468	477	2	
473		486	495	504	514	523	532	541	550	560	569	3	
474		578	587	596	605	614	624	633	642	651	660	4	
475		669	679	688	697	706	715	724	733	742	752	5	
476		761	770	779	788	797	806	815	825	834	843	6	
477		852	861	870	879	888	897	906	916	925	934	7	
478		943	952	961	970	979	988	997	*006	*015	*024	8	
479	68	034	043	052	061	070	079	088	097	106	115	9	
480		124	133	142	151	160	169	178	187	196	205		
481		215	224	233	242	251	260	269	278	287	296		
482		305	314	323	332	341	350	359	368	377	386		
483		395	404	413	422	431	440	449	458	467	476		
484		485	494	502	511	520	529	538	547	556	565		
485		574	583	592	601	610	619	628	637	646	655		
486		664	673	681	690	699	708	717	726	735	744		
487		753	762	771	780	789	797	806	815	824	833	8	
488		842	851	860	869	878	886	895	904	913	922	1	
489		931	940	949	958	966	975	984	993	*002	*011	2	
490	69	020	028	037	046	055	064	073	082	090	099	3	
491		108	117	126	135	144	152	161	170	179	188	4	
492		197	205	214	223	232	241	249	258	267	276	5	
493		285	294	302	311	320	329	338	346	355	364	6	
494		373	381	390	399	408	417	425	434	443	452	7	
495		461	469	478	487	496	504	513	522	531	539	8	
496		548	557	566	574	583	592	601	609	618	627	9	
497		636	644	653	662	671	679	688	697	705	714		
498		723	732	740	749	758	767	775	784	793	801		
499		810	819	827	836	845	854	862	871	880	888		
500		897	906	914	923	932	940	949	958	966	975		
N.	L.	0	1	2	3	4	5	6	7	8	9	P. P.	
		S.	T.				S.	T.				S.	T.
4'	6.46	373	373	0°	7' = 420"	4.68	557	558	1°	18' = 4680"	4.68	554	565
5		373	373	0	8 = 480		557	558	I	19 = 4740		554	565
				0	9 = 540		557	558	I	20 = 4800		554	565
45		371	375	I	15 = 4500		554	564	I	21 = 4860		553	566
48		371	375	I	16 = 4560		554	565	I	22 = 4920		553	566
49		371	376	I	17 = 4620		554	565	I	23 = 4980		553	566
50		371	376	I	18 = 4680		554	565	I	24 = 5040		553	566

N.	L.	0	1	2	3	4	5	6	7	8	9	P. P.
500	69	897	906	914	923	932	940	949	958	966	975	
501		984	992	*001	*010	*018	*027	*036	*044	*053	*062	
502	70	070	079	088	096	105	114	122	131	140	148	
503		157	165	174	183	191	200	209	217	226	234	
504		243	252	260	269	278	286	295	303	312	321	
505		329	338	346	355	364	372	381	389	398	406	
506		415	424	432	441	449	458	467	475	484	492	9
507		501	509	518	526	535	544	552	561	569	578	1 0.9
508		586	595	603	612	621	629	638	646	655	663	2 1.8
509		672	680	689	697	706	714	723	731	740	749	3 2.7
510		757	766	774	783	791	800	808	817	825	834	4 3.6
511		842	851	859	868	876	885	893	902	910	919	5 4.5
512		927	935	944	952	961	969	978	986	995	*003	6 5.4
513	71	012	020	029	037	046	054	063	071	079	088	7 6.3
514		096	105	113	122	130	139	147	155	164	172	8 7.2
515		181	189	198	206	214	223	231	240	248	257	9 8.1
516		265	273	282	290	299	307	315	324	332	341	
517		349	357	366	374	383	391	399	408	416	425	
518		433	441	450	458	466	475	483	492	500	508	
519		517	525	533	542	550	559	567	575	584	592	
520		600	609	617	625	634	642	650	659	667	675	8
521		684	692	700	709	717	725	734	742	750	759	1 0.8
522		767	775	784	792	800	809	817	825	834	842	2 1.6
523		850	858	867	875	883	892	900	908	917	925	3 2.4
524		933	941	950	958	966	975	983	991	999	*008	4 3.2
525	72	016	024	032	041	049	057	066	074	082	090	5 4.0
526		099	107	115	123	132	140	148	156	165	173	6 4.8
527		181	189	198	206	214	222	230	239	247	255	7 5.6
528		263	272	280	288	296	304	313	321	329	337	8 6.4
529		346	354	362	370	378	387	395	403	411	419	9 7.2
530		428	436	444	452	460	469	477	485	493	501	
531		509	518	526	534	542	550	558	567	575	583	
532		591	599	607	616	624	632	640	648	656	665	
533		673	681	689	697	705	713	722	730	738	746	
534		754	762	770	779	787	795	803	811	819	827	
535		835	843	852	860	868	876	884	892	900	908	
536		916	925	933	941	949	957	965	973	981	989	7
537		997	*006	*014	*022	*030	*038	*046	*054	*062	*070	1 0.7
538	73	078	086	094	102	111	119	127	135	143	151	2 1.4
539		159	167	175	183	191	199	207	215	223	231	3 2.1
540		239	247	255	263	272	280	288	296	304	312	4 2.8
541		320	328	336	344	352	360	368	376	384	392	5 3.5
542		400	408	416	424	432	440	448	456	464	472	6 4.2
543		480	488	496	504	512	520	528	536	544	552	7 4.9
544		560	568	576	584	592	600	608	616	624	632	8 5.6
545		640	648	656	664	672	679	687	695	703	711	9 6.3
546		719	727	735	743	751	759	767	775	783	791	
547		799	807	815	823	830	838	846	854	862	870	
548		878	886	894	902	910	918	926	933	941	949	
549		957	965	973	981	989	997	*005	*013	*020	*028	
550	74	036	044	052	060	068	076	084	092	099	107	
N.	L.	0	1	2	3	4	5	6	7	8	9	P. P.
		S.' T.'					S." T."					S." T."
5'	6.46	373	373	0° 8' = 480"	4.68	557	558	1° 26' = 5160"	4.68	553	567	
6		373	373	0 9 = 540		557	558	1 27 = 5220		553	567	
50		371	376	0 10 = 600		557	558	1 28 = 5280		553	567	
55		371	376	1 23 = 4980		553	566	1 29 = 5340		553	567	
				1 24 = 5040		553	566	1 30 = 5400		553	567	
				1 25 = 5100		553	566	1 31 = 5460		552	568	
				1 26 = 5160		553	567	1 32 = 5520		552	568	

N.	L.	0	1	2	3	4	5	6	7	8	9	P. P.
<b>550</b>	74	036	044	052	060	068	076	084	092	099	107	
551		115	123	131	139	147	155	162	170	178	186	
552		194	202	210	218	225	233	241	249	257	265	
553		273	280	288	296	304	312	320	327	335	343	
554		351	359	367	374	382	390	398	406	414	421	
555		429	437	445	453	461	468	476	484	492	500	
556		507	515	523	531	539	547	554	562	570	578	
557		586	593	601	609	617	624	632	640	648	656	
558		663	671	679	687	695	702	710	718	726	733	
559		741	749	757	764	772	780	788	796	803	811	
<b>560</b>		819	827	834	842	850	858	865	873	881	889	8
561		896	904	912	920	927	935	943	950	958	966	1 0.8
562		974	981	989	997	*005	*012	*020	*028	*035	*043	2 1.6
563	75	051	059	066	074	082	089	097	105	113	120	3 2.4
564		128	136	143	151	159	166	174	182	189	197	4 3.2
565		205	213	220	228	236	243	251	259	266	274	5 4.0
566		282	289	297	305	312	320	328	335	343	351	6 4.8
567		358	366	374	381	389	397	404	412	420	427	7 5.6
568		435	442	450	458	465	473	481	488	496	504	8 6.4
569		511	519	526	534	542	549	557	565	572	580	9 7.2
<b>570</b>		587	595	603	610	618	626	633	641	648	656	
571		664	671	679	686	694	702	709	717	724	732	
572		740	747	755	762	770	778	785	793	800	808	
573		815	823	831	838	846	853	861	868	876	884	
574		891	899	906	914	921	929	937	944	952	959	
575		967	974	982	989	997	*005	*012	*020	*027	*035	
576	76	042	050	057	065	072	080	087	095	103	110	
577		118	125	133	140	148	155	163	170	178	185	
578		193	200	208	215	223	230	238	245	253	260	
579		268	275	283	290	298	305	313	320	328	335	
<b>580</b>		343	350	358	365	373	380	388	395	403	410	7
581		418	425	433	440	448	455	462	470	477	485	1 0.7
582		492	500	507	515	522	530	537	545	552	559	2 1.4
583		567	574	582	589	597	604	612	619	626	634	3 2.1
584		641	649	656	664	671	678	686	693	701	708	4 2.8
585		716	723	730	738	745	753	760	768	775	782	5 3.5
586		790	797	805	812	819	827	834	842	849	856	6 4.2
587		864	871	879	886	893	901	908	916	923	930	7 4.9
588		938	945	953	960	967	975	982	989	997	*004	8 5.6
589	77	012	019	026	034	041	048	056	063	070	078	9 6.3
<b>590</b>		085	093	100	107	115	122	129	137	144	151	
591		159	166	173	181	188	195	203	210	217	225	
592		232	240	247	254	262	269	276	283	291	298	
593		305	313	320	327	335	342	349	357	364	371	
594		379	386	393	401	408	415	422	430	437	444	
595		452	459	466	474	481	488	495	503	510	517	
596		525	532	539	546	554	561	568	576	583	590	
597		597	605	612	619	627	634	641	648	656	663	
598		670	677	685	692	699	706	714	721	728	735	
599		743	750	757	764	772	779	786	793	801	808	
<b>600</b>		815	822	830	837	844	851	859	866	873	880	
N.	L.	0	1	2	3	4	5	6	7	8	9	P. P.
		S.' T.'						S." T."				
6'	6.46	373	373	0° 9' = 540"		4.68	557	558	1° 35' = 5700"		4.68	552 569
55	37 <sup>1</sup>	376	0 10 = 600				557	558	1 36 = 5760			552 569
56	37 <sup>1</sup>	376	1 31 = 5460				552	568	1 37 = 5820			552 569
57	37 <sup>1</sup>	377	1 32 = 5520				552	568	1 38 = 5880			552 569
58	37 <sup>1</sup>	377	1 33 = 5580				552	568	1 39 = 5940			551 569
59	37 <sup>0</sup>	377	1 34 = 5640				552	568	1 40 = 6000			551 570
60	37 <sup>0</sup>	377	1 35 = 5700				552	569				



N.	L.	0	1	2	3	4	5	6	7	8	9	P. P.	
600	77	815	822	830	837	844	851	859	866	873	880		
601		887	895	902	909	916	924	931	938	945	952		
602		960	967	974	981	988	996	*003	*010	*017	*025		
603	78	032	039	046	053	061	068	075	082	089	097		
604		104	111	118	125	132	140	147	154	161	168		
605		176	183	190	197	204	211	219	226	233	240		
606		247	254	262	269	276	283	290	297	305	312	8	
607		319	326	333	340	347	355	362	369	376	383	1	0.8
608		390	398	405	412	419	426	433	440	447	455	2	1.6
609		462	469	476	483	490	497	504	512	519	526	3	2.4
610		533	540	547	554	561	569	576	583	590	597	4	3.2
611		604	611	618	625	633	640	647	654	661	668	5	4.0
612		675	682	689	696	704	711	718	725	732	739	6	4.8
613		746	753	760	767	774	781	789	796	803	810	7	5.6
614		817	824	831	838	845	852	859	866	873	880	8	6.4
615		888	895	902	909	916	923	930	937	944	951	9	7.2
616		958	965	972	979	986	993	*000	*007	*014	*021		
617	79	029	036	043	050	057	064	071	078	085	092		
618		099	106	113	120	127	134	141	148	155	162		
619		169	176	183	190	197	204	211	218	225	232		
620		239	246	253	260	267	274	281	288	295	302	7	
621		309	316	323	330	337	344	351	358	365	372	1	0.7
622		379	386	393	400	407	414	421	428	435	442	2	1.4
623		449	456	463	470	477	484	491	498	505	511	3	2.1
624		518	525	532	539	546	553	560	567	574	581	4	2.8
625		588	595	602	609	616	623	630	637	644	650	5	3.5
626		657	664	671	678	685	692	699	706	713	720	6	4.2
627		727	734	741	748	754	761	768	775	782	789	7	4.9
628		796	803	810	817	824	831	837	844	851	858	8	5.6
629		865	872	879	886	893	900	906	913	920	927	9	6.3
630		934	941	948	955	962	969	975	982	989	996		
631	80	003	010	017	024	030	037	044	051	058	065		
632		072	079	085	092	099	106	113	120	127	134		
633		140	147	154	161	168	175	182	188	195	202		
634		209	216	223	229	236	243	250	257	264	271		
635		277	284	291	298	305	312	318	325	332	339		
636		346	353	359	366	373	380	387	393	400	407	6	
637		414	421	428	434	441	448	455	462	468	475	1	0.6
638		482	489	496	502	509	516	523	530	536	543	2	1.2
639		550	557	564	570	577	584	591	598	604	611	3	1.8
640		618	625	632	638	645	652	659	665	672	679	4	2.4
641		686	693	699	706	713	720	726	733	740	747	5	3.0
642		754	760	767	774	781	787	794	801	808	814	6	3.6
643		821	828	835	841	848	855	862	868	875	882	7	4.2
644		889	895	902	909	916	922	929	936	943	949	8	4.8
645		956	963	969	976	983	990	996	*003	*010	*017	9	5.4
646	81	023	030	037	043	050	057	064	070	077	084		
647		090	097	104	111	117	124	131	137	144	151		
648		158	164	171	178	184	191	198	204	211	218		
649		224	231	238	245	251	258	265	271	278	285		
650		291	298	305	311	318	325	331	338	345	351		
N.	L.	0	1	2	3	4	5	6	7	8	9	P. P.	
	S.	T.					S.	T.				S.	T.
6	6.46	373	373		0° 10' = 600"	4.68	557	558		1° 44' = 6240"	4.68	551	571
7		373	373		0 11 = 660		557	558		I 45 = 6300		551	571
60		370	377		I 40 = 6000		551	570		I 46 = 6360		551	571
63		370	377		I 41 = 6060		551	570		I 47 = 6420		550	572
64		370	378		I 42 = 6120		551	570		I 48 = 6480		550	572
65		370	378		I 43 = 6180		551	570		I 49 = 6540		550	572
					I 44 = 6240		551	571					

N.	L.	0	1	2	3	4	5	6	7	8	9	P. P.
<b>650</b>	81	291	298	305	311	318	325	331	338	345	351	
651		358	365	371	378	385	391	398	405	411	418	
652		425	431	438	445	451	458	465	471	478	485	
653		491	498	505	511	518	525	531	538	544	551	
654		558	564	571	578	584	591	598	604	611	617	
655		624	631	637	644	651	657	664	671	677	684	
656		690	697	704	710	717	723	730	737	743	750	
657		757	763	770	776	783	790	796	803	809	816	
658		823	829	836	842	849	856	862	869	875	882	
659		889	895	902	908	915	921	928	935	941	948	
<b>660</b>		954	961	968	974	981	987	994	*000	*007	*014	7
661	82	020	027	033	040	046	053	060	066	073	079	1 0.7
662		086	092	099	105	112	119	125	132	138	145	2 1.4
663		151	158	164	171	178	184	191	197	204	210	3 2.1
664		217	223	230	236	243	249	256	263	269	276	4 2.8
665		282	289	295	302	308	315	321	328	334	341	5 3.5
666		347	354	360	367	373	380	387	393	400	406	6 4.2
667		413	419	426	432	439	445	452	458	465	471	7 4.9
668		478	484	491	497	504	510	517	523	530	536	8 5.6
669		543	549	556	562	569	575	582	588	595	601	9 6.3
<b>670</b>		607	614	620	627	633	640	646	653	659	666	
671		672	679	685	692	698	705	711	718	724	730	
672		737	743	750	756	763	769	776	782	789	795	
673		802	808	814	821	827	834	840	847	853	860	
674		866	872	879	885	892	898	905	911	918	924	
675		930	937	943	950	956	963	969	975	982	988	
676		995	*001	*008	*014	*020	*027	*033	*040	*046	*052	
677	83	059	065	072	078	085	091	097	104	110	117	
678		123	129	136	142	149	155	161	168	174	181	
679		187	193	200	206	213	219	225	232	238	245	
<b>680</b>		251	257	264	270	276	283	289	296	302	308	6
681		315	321	327	334	340	347	353	359	366	372	1 0.6
682		378	385	391	398	404	410	417	423	429	436	2 1.2
683		442	448	455	461	467	474	480	487	493	499	3 1.8
684		506	512	518	525	531	537	544	550	556	563	4 2.4
685		569	575	582	588	594	601	607	613	620	626	5 3.0
686		632	639	645	651	658	664	670	677	683	689	6 3.6
687		696	702	708	715	721	727	734	740	746	753	7 4.2
688		759	765	771	778	784	790	797	803	809	816	8 4.8
689		822	828	835	841	847	853	860	866	872	879	9 5.4
<b>690</b>		885	891	897	904	910	916	923	929	935	942	
691		948	954	960	967	973	979	985	992	998	*004	
692	84	011	017	023	029	036	042	048	055	061	067	
693		073	080	086	092	098	105	111	117	123	130	
694		136	142	148	155	161	167	173	180	186	192	
695		198	205	211	217	223	230	236	242	248	255	
696		261	267	273	280	286	292	298	305	311	317	
697		323	330	336	342	348	354	361	367	373	379	
698		386	392	398	404	410	417	423	429	435	442	
699		448	454	460	466	473	479	485	491	497	504	
<b>700</b>		510	516	522	528	535	541	547	553	559	566	
N.	L.	0	1	2	3	4	5	6	7	8	9	P. P.
		S.' T.'				S." T."						S." T."
6'	6.46	373	373			0° 10' = 600" 4.68	557	558	1° 51' = 6660" 4.68	550	573	
7		373	373			0 11 = 660	557	558	1 52 = 6720	550	573	
65		370	378			0 12 = 720	557	558	1 53 = 6780	550	573	
69		370	378			1 48 = 6480	550	572	1 54 = 6840	550	573	
70		370	379			1 49 = 6540	550	572	1 55 = 6900	549	574	
						1 50 = 6600	550	572	1 56 = 6960	549	574	
						1 51 = 6660	550	573	1 57 = 7020	549	574	

N.	L.	0	I	2	3	4	5	6	7	8	9	P. P.
700	84	510	516	522	528	535	541	547	553	559	566	
701		572	578	584	590	597	603	609	615	621	628	
702		634	640	646	652	658	665	671	677	683	689	
703		696	702	708	714	720	726	733	739	745	751	
704		757	763	770	776	782	788	794	800	807	813	
705		819	825	831	837	844	850	856	862	868	874	
706		880	887	893	899	905	911	917	924	930	936	7
707		942	948	954	960	967	973	979	985	991	997	1 0.7
708	85	003	009	016	022	028	034	040	046	052	058	2 1.4
709		065	071	077	083	089	095	101	107	114	120	3 2.1
710		126	132	138	144	150	156	163	169	175	181	4 2.8
711		187	193	199	205	211	217	224	230	236	242	5 3.5
712		248	254	260	266	272	278	285	291	297	303	6 4.2
713		309	315	321	327	333	339	345	352	358	364	7 4.9
714		370	376	382	388	394	400	406	412	418	425	8 5.6
715		431	437	443	449	455	461	467	473	479	485	9 6.3
716		491	497	503	509	516	522	528	534	540	546	
717		552	558	564	570	576	582	588	594	600	606	
718		612	618	625	631	637	643	649	655	661	667	
719		673	679	685	691	697	703	709	715	721	727	
720		733	739	745	751	757	763	769	775	781	788	6
721		794	800	806	812	818	824	830	836	842	848	1 0.6
722		854	860	866	872	878	884	890	896	902	908	2 1.2
723		914	920	926	932	938	944	950	956	962	968	3 1.8
724		974	980	986	992	998	*004	*010	*016	*022	*028	4 2.4
725	86	034	040	046	052	058	064	070	076	082	088	5 3.0
726		094	100	106	112	118	124	130	136	141	147	6 3.6
727		153	159	165	171	177	183	189	195	201	207	7 4.2
728		213	219	225	231	237	243	249	255	261	267	8 4.8
729		273	279	285	291	297	303	308	314	320	326	9 5.4
730		332	338	344	350	356	362	368	374	380	386	
731		392	398	404	410	415	421	427	433	439	445	
732		451	457	463	469	475	481	487	493	499	504	
733		510	516	522	528	534	540	546	552	558	564	
734		570	576	581	587	593	599	605	611	617	623	
735		629	635	641	646	652	658	664	670	676	682	
736		688	694	700	705	711	717	723	729	735	741	5
737		747	753	759	764	770	776	782	788	794	800	1 0.5
738		806	812	817	823	829	835	841	847	853	859	2 1.0
739		864	870	876	882	888	894	900	906	911	917	3 1.5
740		923	929	935	941	947	953	958	964	970	976	4 2.0
741		982	988	994	999	*005	*011	*017	*023	*029	*035	5 2.5
742	87	040	046	052	058	064	070	075	081	087	093	6 3.0
743		099	105	111	116	122	128	134	140	146	151	7 3.5
744		157	163	169	175	181	186	192	198	204	210	8 4.0
745		216	221	227	233	239	245	251	256	262	268	9 4.5
746		274	280	286	291	297	303	309	315	320	326	
747		332	338	344	349	355	361	367	373	379	384	
748		390	396	402	408	413	419	425	431	437	442	
749		448	454	460	466	471	477	483	489	495	500	
750		506	512	518	523	529	535	541	547	552	558	
N.	L.	0	I	2	3	4	5	6	7	8	9	P. P.
		S.' T.'	S.'' T.''						S.'' T.''			
7'	6.46	373 373	0° 11' = 660'' 4.68 557 558						1° 59' = 7140'' 4.68 549 575			
8		373 373	0 12 = 720 557 558						2 0 = 7200 549 575			
70	370	379	0 13 = 780 557 558						2 1 = 7260 549 575			
71	370	379	I 56 = 6960 549 574						2 2 = 7320 548 576			
72	369	379	I 57 = 7020 549 574						2 3 = 7380 548 576			
74	369	379	I 58 = 7080 549 575						2 4 = 7440 548 576			
75	369	380	I 59 = 7140 549 575						2 5 = 7500 548 577			



N.	L.	0	1	2	3	4	5	6	7	8	9	P. P.	
750	87	506	512	518	523	529	535	541	547	552	558		
751		564	570	576	581	587	593	599	604	610	616		
752		622	628	633	639	645	651	656	662	668	674		
753		679	685	691	697	703	708	714	720	726	731		
754		737	743	749	754	760	766	772	777	783	789		
755		795	800	806	812	818	823	829	835	841	846		
756		852	858	864	869	875	881	887	892	898	904		
757		910	915	921	927	933	938	944	950	955	961		
758		967	973	978	984	990	996	*001	*007	*013	*018		
759	88	024	030	036	041	047	053	058	064	070	076		
760		081	087	093	098	104	110	116	121	127	133		
761		138	144	150	156	161	167	173	178	184	190	6	
762		195	201	207	213	218	224	230	235	241	247	1 0.6	
763		252	258	264	270	275	281	287	292	298	304	2 1.2	
764		309	315	321	326	332	338	343	349	355	360	3 1.8	
765		366	372	377	383	389	395	400	406	412	417	4 2.4	
766		423	429	434	440	446	451	457	463	468	474	5 3.0	
767		480	485	491	497	502	508	513	519	525	530	6 3.6	
768		536	542	547	553	559	564	570	576	581	587	7 4.2	
769		593	598	604	610	615	621	627	632	638	643	8 4.8	
770		649	655	660	666	672	677	683	689	694	700	9 5.4	
771		705	711	717	722	728	734	739	745	750	756		
772		762	767	773	779	784	790	795	801	807	812		
773		818	824	829	835	840	846	852	857	863	868		
774		874	880	885	891	897	902	908	913	919	925		
775		930	936	941	947	953	958	964	969	975	981		
776		986	992	997	*003	*009	*014	*020	*025	*031	*037		
777	89	042	048	053	059	064	070	076	081	087	092		
778		098	104	109	115	120	126	131	137	143	148		
779		154	159	165	170	176	182	187	193	198	204		
780		209	215	221	226	232	237	243	248	254	260		
781		265	271	276	282	287	293	298	304	310	315	5	
782		321	326	332	337	343	348	354	360	365	371	1 0.5	
783		376	382	387	393	398	404	409	415	421	426	2 1.0	
784		432	437	443	448	454	459	465	470	476	481	3 1.5	
785		487	492	498	504	509	515	520	526	531	537	4 2.0	
786		542	548	553	559	564	570	575	581	586	592	5 2.5	
787		597	603	609	614	620	625	631	636	642	647	6 3.0	
788		653	658	664	669	675	680	686	691	697	702	7 3.5	
789		708	713	719	724	730	735	741	746	752	757	8 4.0	
790		763	768	774	779	785	790	796	801	807	812	9 4.5	
791		818	823	829	834	840	845	851	856	862	867		
792		873	878	883	889	894	900	905	911	916	922		
793		927	933	938	944	949	955	960	966	971	977		
794		982	988	993	998	*004	*009	*015	*020	*026	*031		
795	90	037	042	048	053	059	064	069	075	080	086		
796		091	097	102	108	113	119	124	129	135	140		
797		146	151	157	162	168	173	179	184	189	195		
798		200	206	211	217	222	227	233	238	244	249		
799		255	260	266	271	276	282	287	293	298	304		
800		309	314	320	325	331	336	342	347	352	358		
N.	L.	0	1	2	3	4	5	6	7	8	9	P. P.	
		S.' T.'					S.'' T.''					S.'' T.''	
7'	6.46	373	373	0°	12' = 720''	4.68	557	558	2°	8' = 7680''	4.68	547	578
8		373	373	0	13 = 780		557	558	2	9 = 7740		547	578
75		369	380	0	14 = 840		557	558	2	10 = 7800		547	578
80		369	380	2	5 = 7500		548	577	2	11 = 7860		547	579
				2	6 = 7560		548	577	2	12 = 7920		547	579
				2	7 = 7620		548	577	2	13 = 7980		547	579
				2	8 = 7680		547	578	2	14 = 8040		546	579

N.	L.	0	1	2	3	4	5	6	7	8	9	P. P.	
800	90	309	314	320	325	331	336	342	347	352	358		
801		363	369	374	380	385	390	396	401	407	412		
802		417	423	428	434	439	445	450	455	461	466		
803		472	477	482	488	493	499	504	509	515	520		
804		526	531	536	542	547	553	558	563	569	574		
805		580	585	590	596	601	607	612	617	623	628		
806		634	639	644	650	655	660	666	671	677	682		
807		687	693	698	703	709	714	720	725	730	736		
808		741	747	752	757	763	768	773	779	784	789		
809		795	800	806	811	816	822	827	832	838	843		
810		849	854	859	865	870	875	881	886	891	897		
811		902	907	913	918	924	929	934	940	945	950	6	
812		956	961	966	972	977	982	988	993	998	*004	1	0.6
813	91	009	014	020	025	030	036	041	046	052	057	2	1.2
814		062	068	073	078	084	089	094	100	105	110	3	1.8
815		116	121	126	132	137	142	148	153	158	164	4	2.4
816		169	174	180	185	190	196	201	206	212	217	5	3.0
817		222	228	233	238	243	249	254	259	265	270	6	3.6
818		275	281	286	291	297	302	307	312	318	323	7	4.2
819		328	334	339	344	350	355	360	365	371	376	8	4.8
820		381	387	392	397	403	408	413	418	424	429	9	5.4
821		434	440	445	450	455	461	466	471	477	482		
822		487	492	498	503	508	514	519	524	529	535		
823		540	545	551	556	561	566	572	577	582	587		
824		593	598	603	609	614	619	624	630	635	640		
825		645	651	656	661	666	672	677	682	687	693		
826		698	703	709	714	719	724	730	735	740	745		
827		751	756	761	766	772	777	782	787	793	798		
828		803	808	814	819	824	829	834	840	845	850		
829		855	861	866	871	876	882	887	892	897	903		
830		908	913	918	924	929	934	939	944	950	955	5	
831		960	965	971	976	981	986	991	997	*002	*007	1	0.5
832	92	012	018	023	028	033	038	044	049	054	059	2	1.0
833		065	070	075	080	085	091	096	101	106	111	3	1.5
834		117	122	127	132	137	143	148	153	158	163	4	2.0
835		169	174	179	184	189	195	200	205	210	215	5	2.5
836		221	226	231	236	241	247	252	257	262	267	6	3.0
837		273	278	283	288	293	298	304	309	314	319	7	3.5
838		324	330	335	340	345	350	355	361	366	371	8	4.0
839		376	381	387	392	397	402	407	412	418	423	9	4.5
840		428	433	438	443	449	454	459	464	469	474		
841		480	485	490	495	500	505	511	516	521	526		
842		531	536	542	547	552	557	562	567	572	578		
843		583	588	593	598	603	609	614	619	624	629		
844		634	639	645	650	655	660	665	670	675	681		
845		686	691	696	701	706	711	716	722	727	732		
846		737	742	747	752	758	763	768	773	778	783		
847		788	793	799	804	809	814	819	824	829	834		
848		840	845	850	855	860	865	870	875	881	886		
849		891	896	901	906	911	916	921	927	932	937		
850		942	947	952	957	962	967	973	978	983	988		
N.	L.	0	1	2	3	4	5	6	7	8	9	P. P.	
	S.	T.					S.	T.				S.	T.
8'	6.46	373	373	0° 13' =	780"	4.68	557	558	2° 16' =	8160"	4.68	546	580
9		373	373	0 14 =	840		557	558	2 17 =	8220		546	580
				0 15 =	900		557	558	2 18 =	8280		546	581
80	369	380		2 13 =	7980		547	579	2 19 =	8340		546	581
81	369	381		2 14 =	8040		546	579	2 20 =	8400		545	582
82	368	381		2 15 =	8100		546	580	2 21 =	8460		545	582
85	368	381		2 16 =	8160		546	580	2 22 =	8520		545	582

N.	L.	0	1	2	3	4	5	6	7	8	9	P. P.			
850	92	942	947	952	957	962	967	973	978	983	988				
851		993	998	*003	*008	*013	*018	*024	*029	*034	*039				
852	93	044	049	054	059	064	069	075	080	085	090				
853		095	100	105	110	115	120	125	131	136	141				
854		146	151	156	161	166	171	176	181	186	192				
855		197	202	207	212	217	222	227	232	237	242				
856		247	252	258	263	268	273	278	283	288	293	6			
857		298	303	308	313	318	323	328	334	339	344	1 0.6			
858		349	354	359	364	369	374	379	384	389	394	2 1.2			
859		399	404	409	414	420	425	430	435	440	445	3 1.8			
860		450	455	460	465	470	475	480	485	490	495	4 2.4			
861		500	505	510	515	520	526	531	536	541	546	5 3.0			
862		551	556	561	566	571	576	581	586	591	596	6 3.6			
863		601	606	611	616	621	626	631	636	641	646	7 4.2			
864		651	656	661	666	671	676	682	687	692	697	8 4.8			
865		702	707	712	717	722	727	732	737	742	747	9 5.4			
866		752	757	762	767	772	777	782	787	792	797				
867		802	807	812	817	822	827	832	837	842	847				
868		852	857	862	867	872	877	882	887	892	897				
869		902	907	912	917	922	927	932	937	942	947				
870		952	957	962	967	972	977	982	987	992	997	5			
871	94	002	007	012	017	022	027	032	037	042	047	1 0.5			
872		052	057	062	067	072	077	082	086	091	096	2 1.0			
873		101	106	111	116	121	126	131	136	141	146	3 1.5			
874		151	156	161	166	171	176	181	186	191	196	4 2.0			
875		201	206	211	216	221	226	231	236	240	245	5 2.5			
876		250	255	260	265	270	275	280	285	290	295	6 3.0			
877		300	305	310	315	320	325	330	335	340	345	7 3.5			
878		349	354	359	364	369	374	379	384	389	394	8 4.0			
879		399	404	409	414	419	424	429	433	438	443	9 4.5			
880		448	453	458	463	468	473	478	483	488	493				
881		498	503	507	512	517	522	527	532	537	542				
882		547	552	557	562	567	571	576	581	586	591				
883		596	601	606	611	616	621	626	630	635	640				
884		645	650	655	660	665	670	675	680	685	689				
885		694	699	704	709	714	719	724	729	734	738				
886		743	748	753	758	763	768	773	778	783	787	4			
887		792	797	802	807	812	817	822	827	832	836	1 0.4			
888		841	846	851	856	861	866	871	876	880	885	2 0.8			
889		890	895	900	905	910	915	919	924	929	934	3 1.2			
890		939	944	949	954	959	963	968	973	978	983	4 1.6			
891		988	993	998	*002	*007	*012	*017	*022	*027	*032	5 2.0			
892	95	036	041	046	051	056	061	066	071	075	080	6 2.4			
893		085	090	095	100	105	109	114	119	124	129	7 2.8			
894		134	139	143	148	153	158	163	168	173	177	8 3.2			
895		182	187	192	197	202	207	211	216	221	226	9 3.6			
896		231	236	240	245	250	255	260	265	270	274				
897		279	284	289	294	299	303	308	313	318	323				
898		328	332	337	342	347	352	357	361	366	371				
899		376	381	386	390	395	400	405	410	415	419				
900		424	429	434	439	444	448	453	458	463	468				
N.	L.	0	1	2	3	4	5	6	7	8	9	P. P.			
		S.' T.'				S." T."						S." T."			
8'	6.46	373	373	0°	14' =	840"	4.68	557	558	2°	25' =	8700"	4.68	545	583
9		373	373	0	15 =	900		557	558	2	26 =	8760		544	584
85		368	381	2	21 =	8460		545	582	2	27 =	8820		544	584
86		368	382	2	22 =	8520		545	582	2	28 =	8880		544	584
89		368	382	2	23 =	8580		545	583	2	29 =	8940		544	585
90		368	383	2	24 =	8640		545	583	2	30 =	9000		544	585
				2	25 =	8700		545	583						



N.	L.	0	1	2	3	4	5	6	7	8	9	P. P.	
900	95	424	429	434	439	444	448	453	458	463	468		
901		472	477	482	487	492	497	501	506	511	516		
902		521	525	530	535	540	545	550	554	559	564		
903		569	574	578	583	588	593	598	602	607	612		
904		617	622	626	631	636	641	646	650	655	660		
905		665	670	674	679	684	689	694	698	703	708		
906		713	718	722	727	732	737	742	746	751	756		
907		761	766	770	775	780	785	789	794	799	804		
908		809	813	818	823	828	832	837	842	847	852		
909		856	861	866	871	875	880	885	890	895	899		
910		904	909	914	918	923	928	933	938	942	947	5	
911		952	957	961	966	971	976	980	985	990	995	1 0.5	
912		999	*004	*009	*014	*019	*023	*028	*033	*038	*042	2 1.0	
913	96	047	052	057	061	066	071	076	080	085	090	3 1.5	
914		095	099	104	109	114	118	123	128	133	137	4 2.0	
915		142	147	152	156	161	166	171	175	180	185	5 2.5	
916		190	194	199	204	209	213	218	223	227	232	6 3.0	
917		237	242	246	251	256	261	265	270	275	280	7 3.5	
918		284	289	294	298	303	308	313	317	322	327	8 4.0	
919		332	336	341	346	350	355	360	365	369	374	9 4.5	
920		379	384	388	393	398	402	407	412	417	421		
921		426	431	435	440	445	450	454	459	464	468		
922		473	478	483	487	492	497	501	506	511	515		
923		520	525	530	534	539	544	548	553	558	562		
924		567	572	577	581	586	591	595	600	605	609		
925		614	619	624	628	633	638	642	647	652	656		
926		661	666	670	675	680	685	689	694	699	703		
927		708	713	717	722	727	731	736	741	745	750		
928		755	759	764	769	774	778	783	788	792	797		
929		802	806	811	816	820	825	830	834	839	844		
930		848	453	858	862	867	872	876	881	886	890	4	
931		895	900	904	909	914	918	923	928	932	937	1 0.4	
932		942	946	951	956	960	965	970	974	979	984	2 0.8	
933		988	993	997	*002	*007	*011	*016	*021	*025	*030	3 1.2	
934	97	035	039	044	049	053	058	063	067	072	077	4 1.6	
935		081	086	090	095	100	104	109	114	118	123	5 2.0	
936		128	132	137	142	146	151	155	160	165	169	6 2.4	
937		174	179	183	188	192	197	202	206	211	216	7 2.8	
938		220	225	230	234	239	243	248	253	257	262	8 3.2	
939		267	271	276	280	285	290	294	299	304	308	9 3.6	
940		313	317	322	327	331	336	340	345	350	354		
941		359	364	368	373	377	382	387	391	396	400		
942		405	410	414	419	424	428	433	437	442	447		
943		451	456	460	465	470	474	479	483	488	493		
944		497	502	506	511	516	520	525	529	534	539		
945		543	548	552	557	562	566	571	575	580	585		
946		589	594	598	603	607	612	617	621	626	630		
947		635	640	644	649	653	658	663	667	672	676		
948		681	685	690	695	699	704	708	713	717	722		
949		727	731	736	740	745	749	754	759	763	768		
950		772	777	782	786	791	795	800	804	809	813		
N.	L.	0	1	2	3	4	5	6	7	8	9	P. P.	
		S.' T.'				S." T."						S." T."	
9'	6.46	373	373		0° 15' =	900'	4.68	557	558	2° 34' =	9240"	4.68	543 587
10		373	373		0 16 =	960		557	558	2 35 =	9300		543 587
90		368	383		2 30 =	9000		544	585	2 36 =	9360		543 587
91		368	383		2 31 =	9060		544	585	2 37 =	9420		542 588
92		367	383		2 32 =	9120		543	586	2 38 =	9480		542 588
94		367	383		2 33 =	9180		543	586	2 39 =	9540		542 588
95		367	384		2 34 =	9240		543	587				

N.	L.	0	1	2	3	4	5	6	7	8	9	P. P.	
950	97	772	777	782	786	791	795	800	804	809	813		
951		818	823	827	832	836	841	845	850	855	859		
952		864	868	873	877	882	886	891	896	900	905		
953		909	914	918	923	928	932	937	941	946	950		
954		955	959	964	968	973	978	982	987	991	996		
955	98	000	005	009	014	019	023	028	032	037	041		
956		046	050	055	059	064	068	073	078	082	087		
957		091	096	100	105	109	114	118	123	127	132		
958		137	141	146	150	155	159	164	168	173	177		
959		182	186	191	195	200	204	209	214	218	223		
960		227	232	236	241	245	250	254	259	263	268		
961		272	277	281	286	290	295	299	304	308	313		5
962		318	322	327	331	336	340	345	349	354	358	1	0.5
963		363	367	372	376	381	385	390	394	399	403	2	1.0
964		408	412	417	421	426	430	435	439	444	448	3	1.5
965		453	457	462	466	471	475	480	484	489	493	4	2.0
966		498	502	507	511	516	520	525	529	534	538	5	2.5
967		543	547	552	556	561	565	570	574	579	583	6	3.0
968		588	592	597	601	605	610	614	619	623	628	7	3.5
969		632	637	641	646	650	655	659	664	668	673	8	4.0
970		677	682	686	691	695	700	704	709	713	717	9	4.5
971		722	726	731	735	740	744	749	753	758	762		
972		767	771	776	780	784	789	793	798	802	807		
973		811	816	820	825	829	834	838	843	847	851		
974		856	860	865	869	874	878	883	887	892	896		
975		900	905	909	914	918	923	927	932	936	941		
976		945	949	954	958	963	967	972	976	981	985		
977		989	994	998	*003	*007	*012	*016	*021	*025	*029		
978	99	034	038	043	047	052	056	061	065	069	074		
979		078	083	087	092	096	100	105	109	114	118		
980		123	127	131	136	140	145	149	154	158	162		4
981		167	171	176	180	185	189	193	198	202	207	1	0.4
982		211	216	220	224	229	233	238	242	247	251	2	0.8
983		255	260	264	269	273	277	282	286	291	295	3	1.2
984		300	304	308	313	317	322	326	330	335	339	4	1.6
985		344	348	352	357	361	366	370	374	379	383	5	2.0
986		388	392	396	401	405	410	414	419	423	427	6	2.4
987		432	436	441	445	449	454	458	463	467	471	7	2.8
988		476	480	484	489	493	498	502	506	511	515	8	3.2
989		520	524	528	533	537	542	546	550	555	559	9	3.6
990		564	568	572	577	581	585	590	594	599	603		
991		607	612	616	621	625	629	634	638	642	647		
992		651	656	660	664	669	673	677	682	686	691		
993		695	699	704	708	712	717	721	726	730	734		
994		739	743	747	752	756	760	765	769	774	778		
995		782	787	791	795	800	804	808	813	817	822		
996		826	830	835	839	843	848	852	856	861	865		
997		870	874	878	883	887	891	896	900	904	909		
998		913	917	922	926	930	935	939	944	948	952		
999		957	961	965	970	974	978	983	987	991	996		
1000	00	000	004	009	013	017	022	026	030	035	039		
N.	L.	0	1	2	3	4	5	6	7	8	9	P. P.	
		S.	T.				S.	T.				S.	T.
9'	6.46	373	373	0°	15' = 900"	4.68	557	558	2°	41' = 9660"	4.68	542	589
10		373	373	0	16 = 960		557	558	2	42 = 9720		541	590
				0	17 = 1020		557	558	2	43 = 9780		541	590
95		367	384	2	38 = 9480		542	588	2	44 = 9840		541	590
98		367	384	2	39 = 9540		542	588	2	45 = 9900		541	591
99		367	385	2	40 = 9600		542	589	2	46 = 9960		541	591
100		366	385	2	41 = 9660		542	589	2	47 = 10020		540	592



N.	L.	0	1	2	3	4	5	6	7	8	9
<b>1000</b>	000	0000	0434	0869	1303	1737	2171	2605	3039	3473	3907
1001		4341	4775	5208	5642	6076	6510	6943	7377	7810	8244
1002		8677	9111	9544	9977	*0411	*0844	*1277	*1710	*2143	*2576
1003	001	3009	3442	3875	4308	4741	5174	5607	6039	6472	6905
1004		7337	7770	8202	8635	9067	9499	9932	*0364	*0796	*1228
1005	002	1661	2093	2525	2957	3389	3821	4253	4685	5116	5548
1006		5980	6411	6843	7275	7706	8138	8569	9001	9432	9863
1007	003	0295	0726	1157	1588	2019	2451	2882	3313	3744	4174
1008		4605	5036	5467	5898	6328	6759	7190	7620	8051	8481
1009		8912	9342	9772	*0203	*0633	*1063	*1493	*1924	*2354	*2784
<b>1010</b>	004	3214	3644	4074	4504	4933	5363	5793	6223	6652	7082
1011		7512	7941	8371	8800	9229	9659	*0088	*0517	*0947	*1376
1012	005	1805	2234	2663	3092	3521	3950	4379	4808	5237	5666
1013		6094	6523	6952	7380	7809	8238	8666	9094	9523	9951
1014	006	0380	0808	1236	1664	2092	2521	2949	3377	3805	4233
1015		4660	5088	5516	5944	6372	6799	7227	7655	8082	8510
1016		8937	9365	9792	*0219	*0647	*1074	*1501	*1928	*2355	*2782
1017	007	3210	3637	4064	4490	4917	5344	5771	6198	6624	7051
1018		7478	7904	8331	8757	9184	9610	*0037	*0463	*0889	*1316
1019	008	1742	2168	2594	3020	3446	3872	4298	4724	5150	5576
<b>1020</b>		6002	6427	6853	7279	7704	8130	8556	8981	9407	9832
1021	009	0257	0683	1108	1533	1959	2384	2809	3234	3659	4084
1022		4509	4934	5359	5784	6208	6633	7058	7483	7907	8332
1023		8756	9181	9605	*0030	*0454	*0878	*1303	*1727	*2151	*2575
1024	010	3000	3424	3848	4272	4696	5120	5544	5967	6391	6815
1025		7239	7662	8086	8510	8933	9357	9780	*0204	*0627	*1050
1026	011	1474	1897	2320	2743	3166	3590	4013	4436	4859	5282
1027		5704	6127	6550	6973	7396	7818	8241	8664	9086	9509
1028		9931	*0354	*0776	*1198	*1621	*2043	*2465	*2887	*3310	*3732
1029	012	4154	4576	4998	5420	5842	6264	6685	7107	7529	7951
<b>1030</b>		8372	8794	9215	9637	*0059	*0480	*0901	*1323	*1744	*2165
1031	013	2587	3008	3429	3850	4271	4692	5113	5534	5955	6376
1032		6797	7218	7639	8059	8480	8901	9321	9742	*0162	*0583
1033	014	1003	1424	1844	2264	2685	3105	3525	3945	4365	4785
1034		5205	5625	6045	6465	6885	7305	7725	8144	8564	8984
1035		9403	9823	*0243	*0662	*1082	*1501	*1920	*2340	*2759	*3178
1036	015	3598	4017	4436	4855	5274	5693	6112	6531	6950	7369
1037		7788	8206	8625	9044	9462	9881	*0300	*0718	*1137	*1555
1038	016	1974	2392	2810	3229	3647	4065	4483	4901	5319	5737
1039		6155	6573	6991	7409	7827	8245	8663	9080	9498	9916
<b>1040</b>	017	0333	0751	1168	1586	2003	2421	2838	3256	3673	4090
1041		4507	4924	5342	5759	6176	6593	7010	7427	7844	8260
1042		8677	9094	9511	9927	*0344	*0761	*1177	*1594	*2010	*2427
1043	018	2843	3259	3676	4092	4508	4925	5341	5757	6173	6589
1044		7005	7421	7837	8253	8669	9084	9500	9916	*0332	*0747
1045	019	1163	1578	1994	2410	2825	3240	3656	4071	4486	4902
1046		5317	5732	6147	6562	6977	7392	7807	8222	8637	9052
1047		9467	9882	*0296	*0711	*1126	*1540	*1955	*2369	*2784	*3198
1048	020	3613	4027	4442	4856	5270	5684	6099	6513	6927	7341
1049		7755	8169	8583	8997	9411	9824	*0238	*0652	*1066	*1479
<b>1050</b>	021	1893	2307	2720	3134	3547	3961	4374	4787	5201	5614
N.	L.	0	1	2	3	4	5	6	7	8	9
						S."	T."				
2° 46' =	9960"	4.68	541	591	540	592	2° 51' =	10260"	4.68	540	593
2 47 =	10020		540	592	540	592	2 52 =	10320		539	594
2 48 =	10080		540	592	540	592	2 53 =	10380		539	594
2 49 =	10140		540	592	540	592	2 54 =	10440		539	595
2 50 =	10200		540	593	540	593	2 55 =	10500		539	595

N.	L.	0	1	2	3	4	5	6	7	8	9
<b>1050</b>	021	1893	2307	2720	3134	3547	3961	4374	4787	5201	5614
1051		6027	6440	6854	7267	7680	8093	8506	8919	9332	9745
1052	022	0157	0570	0983	1396	1808	2221	2634	3046	3459	3871
1053		4284	4696	5109	5521	5933	6345	6758	7170	7582	7994
1054		8406	8818	9230	9642	*0054	*0466	*0878	*1289	*1701	*2113
1055	023	2525	2936	3348	3759	4171	4582	4994	5405	5817	6228
1056		6639	7050	7462	7873	8284	8695	9106	9517	9928	*0339
1057	024	0750	1161	1572	1982	2393	2804	3214	3625	4036	4446
1058		4857	5267	5678	6088	6498	6909	7319	7729	8139	8549
1059		8960	9370	9780	*0190	*0600	*1010	*1419	*1829	*2239	*2649
<b>1060</b>	025	3059	3468	3878	4288	4697	5107	5516	5926	6335	6744
1061		7154	7563	7972	8382	8791	9200	9609	*0018	*0427	*0836
1062	026	1245	1654	2063	2472	2881	3289	3698	4107	4515	4924
1063		5333	5741	6150	6558	6967	7375	7783	8192	8600	9008
1064		9416	9824	*0233	*0641	*1049	*1457	*1865	*2273	*2680	*3088
1065	027	3496	3904	4312	4719	5127	5535	5942	6350	6757	7165
1066		7572	7979	8387	8794	9201	9609	*0016	*0423	*0830	*1237
1067	028	1644	2051	2458	2865	3272	3679	4086	4492	4899	5306
1068		5713	6119	6526	6932	7339	7745	8152	8558	8964	9371
1069		9777	*0183	*0590	*0996	*1402	*1808	*2214	*2620	*3026	*3432
<b>1070</b>	029	3838	4244	4649	5055	5461	5867	6272	6678	7084	7489
1071		7895	8300	8706	9111	9516	9922	*0327	*0732	*1138	*1543
1072	030	1948	2353	2758	3163	3568	3973	4378	4783	5188	5592
1073		5997	6402	6807	7211	7616	8020	8425	8830	9234	9638
1074	031	0043	0447	0851	1256	1660	2064	2468	2872	3277	3681
1075		4085	4489	4893	5296	5700	6104	6508	6912	7315	7719
1076		8123	8526	8930	9333	9737	*0140	*0544	*0947	*1350	*1754
1077	032	2157	2560	2963	3367	3770	4173	4576	4979	5382	5785
1078		6188	6590	6993	7396	7799	8201	8604	9007	9409	9812
1079	033	0214	0617	1019	1422	1824	2226	2629	3031	3433	3835
<b>1080</b>		4238	4640	5042	5444	5846	6248	6650	7052	7453	7855
1081		8257	8659	9060	9462	9864	*0265	*0667	*1068	*1470	*1871
1082	034	2273	2674	3075	3477	3878	4279	4680	5081	5482	5884
1083		6285	6686	7087	7487	7888	8289	8690	9091	9491	9892
1084	035	0293	0693	1094	1495	1895	2296	2696	3096	3497	3897
1085		4297	4698	5098	5498	5898	6298	6698	7098	7498	7898
1086		8298	8698	9098	9498	9898	*0297	*0697	*1097	*1496	*1896
1087	036	2295	2695	3094	3494	3893	4293	4692	5091	5491	5890
1088		6289	6688	7087	7486	7885	8284	8683	9082	9481	9880
1089	037	0279	0678	1076	1475	1874	2272	2671	3070	3468	3867
<b>1090</b>		4265	4663	5062	5460	5858	6257	6655	7053	7451	7849
1091		8248	8646	9044	9442	9839	*0237	*0635	*1033	*1431	*1829
1092	038	2226	2624	3022	3419	3817	4214	4612	5009	5407	5804
1093		6202	6599	6996	7393	7791	8188	8585	8982	9379	9776
1094	039	0173	0570	0967	1364	1761	2158	2554	2951	3348	3745
1095		4141	4538	4934	5331	5727	6124	6520	6917	7313	7709
1096		8106	8502	8898	9294	9690	*0086	*0482	*0878	*1274	*1670
1097	040	2066	2462	2858	3254	3650	4045	4441	4837	5232	5628
1098		6023	6419	6814	7210	7605	8001	8396	8791	9187	9582
1099		9977	*0372	*0767	*1162	*1557	*1952	*2347	*2742	*3137	*3532
<b>1100</b>	041	3927	4322	4716	5111	5506	5900	6295	6690	7084	7479
N.	L.	0	1	2	3	4	5	6	7	8	9
				S."	T."					S."	T."
	2° 55'	= 10500"	4.68	539	595		3° 0'	= 10800"	4.68	538	597
	2 56	= 10560		539	595		3 1	= 10860		537	598
	2 57	= 10620		538	596		3 2	= 10920		537	598
	2 58	= 10680		538	596		3 3	= 10980		537	599
	2 59	= 10740		538	597		3 4	= 11040		537	599



'	M.	S'. T'.	Sec.	S". T".
		6.46		4.68
0	180	353 412	10800	538 597
1	181	353 413	10860	537 598
2	182	352 413	10920	537 598
3	183	352 414	10980	537 599
4	184	352 414	11040	537 599
5	185	352 415	11100	537 599
6	186	351 415	11160	536 600
7	187	351 415	11220	536 600
8	188	351 416	11280	536 601
9	189	351 416	11340	536 601
10	190	350 417	11400	535 602
11	191	350 417	11460	535 602
12	192	350 418	11520	535 603
13	193	350 418	11580	535 603
14	194	350 419	11640	534 604
15	195	349 419	11700	534 604
16	196	349 420	11760	534 605
17	197	349 420	11820	534 605
18	198	349 421	11880	533 606
19	199	348 421	11940	533 606
20	200	348 422	12000	533 607
21	201	348 422	12060	533 607
22	202	348 423	12120	532 608
23	203	347 423	12180	532 608
24	204	347 424	12240	532 609
25	205	347 424	12300	532 609
26	206	347 425	12360	531 610
27	207	346 425	12420	531 610
28	208	346 426	12480	531 611
29	209	346 426	12540	531 611
30	210	346 427	12600	530 612
31	211	345 427	12660	530 612
32	212	345 428	12720	530 613
33	213	345 428	12780	530 613
34	214	345 429	12840	529 614
35	215	344 429	12900	529 614
36	216	344 430	12960	529 615
37	217	344 430	13020	529 615
38	218	344 431	13080	528 616
39	219	343 431	13140	528 616
40	220	343 432	13200	528 617
41	221	343 432	13260	528 617
42	222	342 433	13320	527 618
43	223	342 434	13380	527 618
44	224	342 434	13440	527 619
45	225	342 435	13500	526 620
46	226	341 435	13560	526 620
47	227	341 436	13620	526 621
48	228	341 436	13680	526 621
49	229	340 437	13740	525 622
50	230	340 437	13800	525 622
51	231	340 438	13860	525 623
52	232	340 439	13920	525 623
53	233	339 439	13980	524 624
54	234	339 440	14040	524 625
55	235	339 440	14100	524 625
56	236	338 441	14160	523 626
57	237	338 441	14220	523 626
58	238	338 442	14280	523 627
59	239	338 443	14340	522 628
60	240	337 443	14400	522 628

'	M.	S'. T'.	Sec.	S". T".
		6.46		4.68
0	240	337 443	14400	522 628
1	241	337 444	14460	522 629
2	242	337 444	14520	522 629
3	243	336 445	14580	521 630
4	244	336 446	14640	521 631
5	245	336 446	14700	521 631
6	246	336 447	14760	520 632
7	247	335 447	14820	520 632
8	248	335 448	14880	520 633
9	249	335 449	14940	520 634
10	250	334 449	15000	519 634
11	251	334 450	15060	519 635
12	252	334 450	15120	519 635
13	253	333 451	15180	518 636
14	254	333 452	15240	518 637
15	255	333 452	15300	518 637
16	256	332 453	15360	517 638
17	257	332 454	15420	517 638
18	258	332 454	15480	517 639
19	259	332 455	15540	516 640
20	260	331 456	15600	516 640
21	261	331 456	15660	516 641
22	262	331 457	15720	515 642
23	263	330 457	15780	515 642
24	264	330 458	15840	515 643
25	265	330 459	15900	514 644
26	266	329 459	15960	514 644
27	267	329 460	16020	514 645
28	268	329 461	16080	513 646
29	269	328 461	16140	513 646
30	270	328 462	16200	513 647
31	271	328 463	16260	512 648
32	272	327 463	16320	512 648
33	273	327 464	16380	512 649
34	274	327 465	16440	511 650
35	275	326 465	16500	511 650
36	276	326 466	16560	511 651
37	277	326 467	16620	510 652
38	278	325 467	16680	510 652
39	279	325 468	16740	510 653
40	280	325 469	16800	509 654
41	281	324 469	16860	509 654
42	282	324 470	16920	509 655
43	283	324 471	16980	508 656
44	284	323 472	17040	508 656
45	285	323 472	17100	508 657
46	286	323 473	17160	507 658
47	287	322 474	17220	507 659
48	288	322 474	17280	507 659
49	289	321 475	17340	506 660
50	290	321 476	17400	506 661
51	291	321 477	17460	506 661
52	292	320 477	17520	505 662
53	293	320 478	17580	505 663
54	294	320 479	17640	505 664
55	295	319 479	17700	504 664
56	296	319 480	17760	504 665
57	297	319 481	17820	503 666
58	298	318 482	17880	503 666
59	299	318 482	17940	503 667
60	300	317 483	18000	502 668

TABLE XVI.

THE LOGARITHMS

OF THE

TRIGONOMETRIC FUNCTIONS

FOR EACH MINUTE.

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**Formulas for the Use of the Auxiliaries *S* and *T*.**

1. When  $\alpha$  is in the first five degrees of the quadrant:

$\log \sin \alpha = \log \alpha' + S.'$ $\log \tan \alpha = \log \alpha' + T.'$ $\log \cot \alpha = \text{cpl } \log \tan \alpha.$		$\log \alpha' = \log \sin \alpha + \text{cpl } S.'$ $\quad = \log \tan \alpha + \text{cpl } T.'$ $\quad = \text{cpl } \log \cot \alpha + \text{cpl } T.'$
$\log \sin \alpha = \log \alpha'' + S''$ $\log \tan \alpha = \log \alpha'' + T''$ $\log \cot \alpha = \text{cpl } \log \tan \alpha.$		$\log \alpha'' = \log \sin \alpha + \text{cpl } S''$ $\quad = \log \tan \alpha + \text{cpl } T''$ $\quad = \text{cpl } \log \cot \alpha + \text{cpl } T''$

2. When  $\alpha$  is in the last five degrees of the quadrant:

$\log \cos \alpha = \log(90^\circ - \alpha)' + S.'$ $\log \cot \alpha = \log(90^\circ - \alpha)' + T.'$ $\log \tan \alpha = \text{cpl } \log \cot \alpha.$		$\log(90^\circ - \alpha)' = \log \cos \alpha + \text{cpl } S.'$ $\quad = \log \cot \alpha + \text{cpl } T.'$ $\quad = \text{cpl } \log \tan \alpha + \text{cpl } T.'$
$\log \cos \alpha = \log(90^\circ - \alpha)'' + S''$ $\log \cot \alpha = \log(90^\circ - \alpha)'' + T''$ $\log \tan \alpha = \text{cpl } \log \cot \alpha.$		$\log(90^\circ - \alpha)'' = \log \cos \alpha + \text{cpl } S''$ $\quad = \log \cot \alpha + \text{cpl } T''$ $\quad = \text{cpl } \log \tan \alpha + \text{cpl } T''$

$$\alpha = 90^\circ - (90^\circ - \alpha).$$



"	'	L. Sin.	d.	Cpl. S'	Cpl. T'	L. Tan.	c. d.	L. Cot.	L. Cos.	
0	0	—	—	—	—	—	—	—	0.00 000	60
60	1	6.46 373	30103	3.53 627	3.53 627	6.46 373	30103	3.53 627	0.00 000	59
120	2	6.76 476	17609	3.53 627	3.53 627	6.76 476	17609	3.23 524	0.00 000	58
180	3	6.94 085	12494	3.53 627	3.53 627	6.94 085	12494	3.05 915	0.00 000	57
240	4	7.06 579	9691	3.53 627	3.53 627	7.06 579	9691	2.93 421	0.00 000	56
300	5	7.16 270	7918	3.53 627	3.53 627	7.16 270	7918	2.83 730	0.00 000	55
360	6	7.24 188	6694	3.53 627	3.53 627	7.24 188	6694	2.75 812	0.00 000	54
420	7	7.30 882	5800	3.53 627	3.53 627	7.30 882	5800	2.69 118	0.00 000	53
480	8	7.36 682	5115	3.53 627	3.53 627	7.36 682	5115	2.63 318	0.00 000	52
540	9	7.41 797	4576	3.53 627	3.53 627	7.41 797	4576	2.58 203	0.00 000	51
600	10	7.46 373	4139	3.53 627	3.53 627	7.46 373	4139	2.53 627	0.00 000	50
660	11	7.50 512	3779	3.53 627	3.53 627	7.50 512	3779	2.49 488	0.00 000	49
720	12	7.54 291	3476	3.53 627	3.53 627	7.54 291	3476	2.45 709	0.00 000	48
780	13	7.57 767	3218	3.53 627	3.53 627	7.57 767	3219	2.42 233	0.00 000	47
840	14	7.60 985	2997	3.53 628	3.53 627	7.60 986	2996	2.39 014	0.00 000	46
900	15	7.63 982	2802	3.53 628	3.53 627	7.63 982	2803	2.36 018	0.00 000	45
960	16	7.66 784	2633	3.53 628	3.53 627	7.66 785	2633	2.33 215	0.00 000	44
1020	17	7.69 417	2483	3.53 628	3.53 627	7.69 418	2482	2.30 582	0.99 999	43
1080	18	7.71 900	2348	3.53 628	3.53 627	7.71 900	2348	2.28 100	0.99 999	42
1140	19	7.74 248	2227	3.53 628	3.53 627	7.74 248	2228	2.25 752	0.99 999	41
1200	20	7.76 475	2119	3.53 628	3.53 627	7.76 476	2119	2.23 524	0.99 999	40
1260	21	7.78 594	2021	3.53 628	3.53 627	7.78 595	2020	2.21 405	0.99 999	39
1320	22	7.80 615	1930	3.53 628	3.53 627	7.80 615	1931	2.19 385	0.99 999	38
1380	23	7.82 545	1848	3.53 628	3.53 627	7.82 540	1848	2.17 454	0.99 999	37
1440	24	7.84 393	1773	3.53 628	3.53 627	7.84 394	1773	2.15 606	0.99 999	36
1500	25	7.86 166	1704	3.53 628	3.53 627	7.86 167	1704	2.13 833	0.99 999	35
1560	26	7.87 870	1639	3.53 628	3.53 627	7.87 871	1639	2.12 129	0.99 999	34
1620	27	7.89 509	1579	3.53 628	3.53 626	7.89 510	1579	2.10 490	0.99 999	33
1680	28	7.91 088	1524	3.53 628	3.53 626	7.91 089	1524	2.08 911	0.99 999	32
1740	29	7.92 612	1472	3.53 628	3.53 626	7.92 613	1473	2.07 387	0.99 998	31
1800	30	7.94 084	1424	3.53 628	3.53 626	7.94 086	1424	2.05 914	0.99 998	30
1860	31	7.95 508	1379	3.53 628	3.53 626	7.95 510	1379	2.04 490	0.99 998	29
1920	32	7.96 887	1336	3.53 628	3.53 626	7.96 889	1336	2.03 111	0.99 998	28
1980	33	7.98 223	1297	3.53 628	3.53 626	7.98 225	1297	2.01 775	0.99 998	27
2040	34	7.99 520	1259	3.53 628	3.53 626	7.99 522	1259	2.00 478	0.99 998	26
2100	35	8.00 779	1223	3.53 628	3.53 626	8.00 781	1223	1.99 219	0.99 998	25
2160	36	8.02 002	1190	3.53 628	3.53 626	8.02 004	1190	1.97 996	0.99 998	24
2220	37	8.03 192	1158	3.53 628	3.53 626	8.03 194	1159	1.96 806	0.99 997	23
2280	38	8.04 350	1128	3.53 628	3.53 626	8.04 353	1128	1.95 647	0.99 997	22
2340	39	8.05 478	1100	3.53 628	3.53 626	8.05 481	1100	1.94 519	0.99 997	21
2400	40	8.06 578	1072	3.53 628	3.53 625	8.06 581	1072	1.93 419	0.99 997	20
2460	41	8.07 650	1046	3.53 628	3.53 625	8.07 653	1047	1.92 347	0.99 997	19
2520	42	8.08 696	1022	3.53 628	3.53 625	8.08 700	1022	1.91 300	0.99 997	18
2580	43	8.09 718	999	3.53 629	3.53 625	8.09 722	998	1.90 278	0.99 997	17
2640	44	8.10 717	976	3.53 629	3.53 625	8.10 720	976	1.89 280	0.99 996	16
2700	45	8.11 693	954	3.53 629	3.53 625	8.11 696	955	1.88 304	0.99 996	15
2760	46	8.12 647	934	3.53 629	3.53 625	8.12 651	934	1.87 349	0.99 996	14
2820	47	8.13 581	914	3.53 629	3.53 625	8.13 585	915	1.86 415	0.99 996	13
2880	48	8.14 495	896	3.53 629	3.53 625	8.14 500	895	1.85 500	0.99 996	12
2940	49	8.15 391	877	3.53 629	3.53 624	8.15 395	878	1.84 605	0.99 996	11
3000	50	8.16 268	860	3.53 629	3.53 624	8.16 273	860	1.83 727	0.99 995	10
3060	51	8.17 128	843	3.53 629	3.53 624	8.17 133	843	1.82 867	0.99 995	9
3120	52	8.17 971	827	3.53 629	3.53 624	8.17 976	828	1.82 024	0.99 995	8
3180	53	8.18 798	812	3.53 629	3.53 624	8.18 804	812	1.81 196	0.99 995	7
3240	54	8.19 610	797	3.53 629	3.53 624	8.19 616	797	1.80 384	0.99 995	6
3300	55	8.20 407	782	3.53 629	3.53 624	8.20 413	782	1.79 587	0.99 994	5
3360	56	8.21 189	769	3.53 629	3.53 624	8.21 195	769	1.78 805	0.99 994	4
3420	57	8.21 958	755	3.53 629	3.53 623	8.21 964	756	1.78 036	0.99 994	3
3480	58	8.22 713	743	3.53 629	3.53 623	8.22 720	742	1.77 280	0.99 994	2
3540	59	8.23 456	730	3.53 630	3.53 623	8.23 462	730	1.76 538	0.99 994	1
3600	60	8.24 186		3.53 630	3.53 623	8.24 192		1.75 808	0.99 993	0
		L. Cos.	d.			L. Cot.	c. d.	L. Tan.	L. Sin.	'

"	'	L. Sin.	d.	Cpl. S'.	Cpl. T'.	L. Tan.	c. d.	L. Cot.	L. Cos.	
3600	0	8.24 186		3.53 630	3.53 623	8.24 192		1.75 808	9.99 993	60
3660	1	8.24 903	717	3.53 630	3.53 623	8.24 910	718	1.75 090	9.99 993	59
3720	2	8.25 609	706	3.53 630	3.53 623	8.25 616	706	1.74 384	9.99 993	58
3780	3	8.26 304	695	3.53 630	3.53 623	8.26 312	696	1.73 688	9.99 993	57
3840	4	8.26 988	684	3.53 630	3.53 622	8.26 996	684	1.73 004	9.99 992	56
3900	5	8.27 661	673	3.53 630	3.53 622	8.27 669	673	1.72 331	9.99 992	55
3960	6	8.28 324	663	3.53 630	3.53 622	8.28 332	663	1.71 668	9.99 992	54
4020	7	8.28 977	653	3.53 630	3.53 622	8.28 986	654	1.71 014	9.99 992	53
4080	8	8.29 621	644	3.53 630	3.53 622	8.29 629	643	1.70 371	9.99 992	52
4140	9	8.30 255	634	3.53 630	3.53 622	8.30 263	634	1.69 737	9.99 991	51
4200	10	8.30 879	624	3.53 630	3.53 621	8.30 888	625	1.69 112	9.99 991	50
4260	11	8.31 495	616	3.53 630	3.53 621	8.31 505	617	1.68 495	9.99 991	49
4320	12	8.32 103	608	3.53 631	3.53 621	8.32 112	607	1.67 888	9.99 990	48
4380	13	8.32 702	599	3.53 631	3.53 621	8.32 711	599	1.67 289	9.99 990	47
4440	14	8.33 292	590	3.53 631	3.53 621	8.33 302	591	1.66 698	9.99 990	46
4500	15	8.33 875	583	3.53 631	3.53 620	8.33 886	584	1.66 114	9.99 990	45
4560	16	8.34 450	575	3.53 631	3.53 620	8.34 461	575	1.65 539	9.99 989	44
4620	17	8.35 018	568	3.53 631	3.53 620	8.35 029	568	1.64 971	9.99 989	43
4680	18	8.35 578	560	3.53 631	3.53 620	8.35 590	561	1.64 410	9.99 989	42
4740	19	8.36 131	553	3.53 631	3.53 620	8.36 143	553	1.63 857	9.99 989	41
4800	20	8.36 678	547	3.53 631	3.53 620	8.36 689	546	1.63 311	9.99 988	40
4860	21	8.37 217	539	3.53 631	3.53 619	8.37 229	540	1.62 771	9.99 988	39
4920	22	8.37 750	533	3.53 632	3.53 619	8.37 762	533	1.62 238	9.99 988	38
4980	23	8.38 276	526	3.53 632	3.53 619	8.38 289	527	1.61 711	9.99 987	37
5040	24	8.38 796	520	3.53 632	3.53 619	8.38 809	520	1.61 191	9.99 987	36
5100	25	8.39 310	514	3.53 632	3.53 619	8.39 323	514	1.60 677	9.99 987	35
5160	26	8.39 818	508	3.53 632	3.53 618	8.39 832	509	1.60 168	9.99 986	34
5220	27	8.40 320	502	3.53 632	3.53 618	8.40 334	502	1.59 666	9.99 986	33
5280	28	8.40 816	496	3.53 632	3.53 618	8.40 830	496	1.59 170	9.99 986	32
5340	29	8.41 307	491	3.53 632	3.53 618	8.41 321	491	1.58 679	9.99 985	31
5400	30	8.41 792	485	3.53 632	3.53 617	8.41 807	486	1.58 193	9.99 985	30
5460	31	8.42 272	480	3.53 632	3.53 617	8.42 287	480	1.57 713	9.99 985	29
5520	32	8.42 746	474	3.53 633	3.53 617	8.42 762	475	1.57 238	9.99 984	28
5580	33	8.43 216	470	3.53 633	3.53 617	8.43 232	470	1.56 768	9.99 984	27
5640	34	8.43 680	464	3.53 633	3.53 617	8.43 696	464	1.56 304	9.99 984	26
5700	35	8.44 139	459	3.53 633	3.53 616	8.44 156	460	1.55 844	9.99 983	25
5760	36	8.44 594	455	3.53 633	3.53 616	8.44 611	455	1.55 389	9.99 983	24
5820	37	8.45 044	450	3.53 633	3.53 616	8.45 061	450	1.54 939	9.99 983	23
5880	38	8.45 489	445	3.53 633	3.53 616	8.45 507	446	1.54 493	9.99 982	22
5940	39	8.45 930	441	3.53 633	3.53 615	8.45 948	441	1.54 052	9.99 982	21
6000	40	8.46 366	436	3.53 634	3.53 615	8.46 385	437	1.53 615	9.99 982	20
6060	41	8.46 799	433	3.53 634	3.53 615	8.46 817	432	1.53 183	9.99 981	19
6120	42	8.47 226	427	3.53 634	3.53 615	8.47 245	428	1.52 755	9.99 981	18
6180	43	8.47 650	424	3.53 634	3.53 614	8.47 669	424	1.52 331	9.99 981	17
6240	44	8.48 069	419	3.53 634	3.53 614	8.48 089	420	1.51 911	9.99 980	16
6300	45	8.48 485	416	3.53 634	3.53 614	8.48 505	416	1.51 495	9.99 980	15
6360	46	8.48 896	411	3.53 634	3.53 614	8.48 917	412	1.51 083	9.99 979	14
6420	47	8.49 304	408	3.53 634	3.53 613	8.49 325	408	1.50 675	9.99 979	13
6480	48	8.49 708	404	3.53 635	3.53 613	8.49 729	404	1.50 271	9.99 979	12
6540	49	8.50 108	400	3.53 635	3.53 613	8.50 130	401	1.49 870	9.99 978	11
6600	50	8.50 504	396	3.53 635	3.53 613	8.50 527	397	1.49 473	9.99 978	10
6660	51	8.50 897	393	3.53 635	3.53 612	8.50 920	393	1.49 080	9.99 977	9
6720	52	8.51 287	390	3.53 635	3.53 612	8.51 310	390	1.48 690	9.99 977	8
6780	53	8.51 673	386	3.53 635	3.53 612	8.51 696	386	1.48 304	9.99 977	7
6840	54	8.52 055	382	3.53 635	3.53 611	8.52 079	383	1.47 921	9.99 976	6
6900	55	8.52 434	379	3.53 635	3.53 611	8.52 459	380	1.47 541	9.99 976	5
6960	56	8.52 810	376	3.53 636	3.53 611	8.52 835	376	1.47 165	9.99 975	4
7020	57	8.53 183	373	3.53 636	3.53 611	8.53 208	373	1.46 792	9.99 975	3
7080	58	8.53 552	369	3.53 636	3.53 610	8.53 578	370	1.46 422	9.99 974	2
7140	59	8.53 919	367	3.53 636	3.53 610	8.53 945	367	1.46 055	9.99 974	1
7200	60	8.54 282	363	3.53 636	3.53 610	8.54 308	363	1.45 692	9.99 974	0
		L. Cos.	d.			L. Cot.	c. d.	L. Tan.	L. Sin.	'



"	'	L. Sin.	d.	Cpl. S'.	Cpl. T'.	L. Tan.	c. d.	L. Cot.	L. Cos.	
7200	0	8.54 282	360	3.53 636	3.53 610	8.54 308	361	1.45 692	9.99 974	60
7260	1	8.54 642	357	3.53 636	3.53 609	8.54 669	358	1.45 331	9.99 973	59
7320	2	8.54 999	355	3.53 637	3.53 609	8.55 027	355	1.44 973	9.99 973	58
7380	3	8.55 354	351	3.53 637	3.53 609	8.55 382	352	1.44 618	9.99 972	57
7440	4	8.55 705	349	3.53 637	3.53 609	8.55 734	349	1.44 266	9.99 972	56
7500	5	8.56 054	346	3.53 637	3.53 608	8.56 083	346	1.43 917	9.99 971	55
7560	6	8.56 400	343	3.53 637	3.53 608	8.56 429	344	1.43 571	9.99 971	54
7620	7	8.56 743	341	3.53 637	3.53 608	8.56 773	341	1.43 227	9.99 970	53
7680	8	8.57 084	337	3.53 637	3.53 607	8.57 114	338	1.42 886	9.99 970	52
7740	9	8.57 421	336	3.53 638	3.53 607	8.57 452	336	1.42 548	9.99 969	51
7800	10	8.57 757	332	3.53 638	3.53 607	8.57 788	333	1.42 212	9.99 969	50
7860	11	8.58 089	330	3.53 638	3.53 606	8.58 121	330	1.41 879	9.99 968	49
7920	12	8.58 419	328	3.53 638	3.53 606	8.58 451	328	1.41 549	9.99 968	48
7980	13	8.58 747	325	3.53 638	3.53 606	8.58 779	326	1.41 221	9.99 967	47
8040	14	8.59 072	323	3.53 638	3.53 605	8.59 105	323	1.40 895	9.99 967	46
8100	15	8.59 395	320	3.53 639	3.53 605	8.59 428	321	1.40 572	9.99 967	45
8160	16	8.59 715	318	3.53 639	3.53 605	8.59 749	319	1.40 251	9.99 966	44
8220	17	8.60 033	316	3.53 639	3.53 604	8.60 068	316	1.39 932	9.99 966	43
8280	18	8.60 349	313	3.53 639	3.53 604	8.60 384	314	1.39 616	9.99 965	42
8340	19	8.60 662	311	3.53 639	3.53 604	8.60 698	311	1.39 302	9.99 964	41
8400	20	8.60 973	309	3.53 639	3.53 603	8.61 009	310	1.38 991	9.99 964	40
8460	21	8.61 282	307	3.53 640	3.53 603	8.61 319	307	1.38 681	9.99 963	39
8520	22	8.61 589	305	3.53 640	3.53 603	8.61 626	305	1.38 374	9.99 963	38
8580	23	8.61 894	302	3.53 640	3.53 602	8.61 931	303	1.38 069	9.99 962	37
8640	24	8.62 196	301	3.53 640	3.53 602	8.62 234	301	1.37 766	9.99 962	36
8700	25	8.62 497	298	3.53 640	3.53 602	8.62 535	299	1.37 465	9.99 961	35
8760	26	8.62 795	296	3.53 640	3.53 601	8.62 834	297	1.37 166	9.99 961	34
8820	27	8.63 091	294	3.53 641	3.53 601	8.63 131	295	1.36 869	9.99 960	33
8880	28	8.63 385	293	3.53 641	3.53 601	8.63 426	292	1.36 574	9.99 960	32
8940	29	8.63 678	290	3.53 641	3.53 600	8.63 718	291	1.36 282	9.99 959	31
9000	30	8.63 968	288	3.53 641	3.53 600	8.64 009	289	1.35 991	9.99 959	30
9060	31	8.64 256	287	3.53 641	3.53 599	8.64 298	287	1.35 702	9.99 958	29
9120	32	8.64 543	284	3.53 642	3.53 599	8.64 585	285	1.35 415	9.99 958	28
9180	33	8.64 827	283	3.53 642	3.53 599	8.64 870	284	1.35 130	9.99 957	27
9240	34	8.65 110	281	3.53 642	3.53 598	8.65 154	281	1.34 846	9.99 956	26
9300	35	8.65 391	279	3.53 642	3.53 598	8.65 435	280	1.34 565	9.99 956	25
9360	36	8.65 670	277	3.53 642	3.53 598	8.65 715	278	1.34 285	9.99 955	24
9420	37	8.65 947	276	3.53 642	3.53 597	8.65 993	276	1.34 007	9.99 955	23
9480	38	8.66 223	274	3.53 643	3.53 597	8.66 269	274	1.33 731	9.99 954	22
9540	39	8.66 497	272	3.53 643	3.53 596	8.66 543	273	1.33 457	9.99 954	21
9600	40	8.66 769	270	3.53 643	3.53 596	8.66 816	271	1.33 184	9.99 953	20
9660	41	8.67 039	269	3.53 643	3.53 596	8.67 087	269	1.32 913	9.99 952	19
9720	42	8.67 308	267	3.53 643	3.53 595	8.67 356	268	1.32 644	9.99 952	18
9780	43	8.67 575	266	3.53 644	3.53 595	8.67 624	266	1.32 376	9.99 951	17
9840	44	8.67 841	263	3.53 644	3.53 594	8.67 890	264	1.32 110	9.99 951	16
9900	45	8.68 104	263	3.53 644	3.53 594	8.68 154	263	1.31 846	9.99 950	15
9960	46	8.68 367	260	3.53 644	3.53 594	8.68 417	261	1.31 583	9.99 949	14
10020	47	8.68 627	259	3.53 645	3.53 593	8.68 678	260	1.31 322	9.99 949	13
10080	48	8.68 886	258	3.53 645	3.53 593	8.68 938	258	1.31 062	9.99 948	12
10140	49	8.69 144	256	3.53 645	3.53 592	8.69 196	257	1.30 804	9.99 948	11
10200	50	8.69 400	254	3.53 645	3.53 592	8.69 453	255	1.30 547	9.99 947	10
10260	51	8.69 654	253	3.53 646	3.53 591	8.69 708	254	1.30 292	9.99 946	9
10320	52	8.69 907	252	3.53 646	3.53 591	8.69 962	252	1.30 038	9.99 946	8
10380	53	8.70 159	250	3.53 646	3.53 590	8.70 214	251	1.29 786	9.99 945	7
10440	54	8.70 409	249	3.53 646	3.53 590	8.70 465	249	1.29 535	9.99 944	6
10500	55	8.70 658	247	3.53 646	3.53 589	8.70 714	248	1.29 286	9.99 944	5
10560	56	8.70 905	246	3.53 647	3.53 589	8.70 962	246	1.29 038	9.99 943	4
10620	57	8.71 151	244	3.53 647	3.53 589	8.71 208	245	1.28 792	9.99 942	3
10680	58	8.71 395	243	3.53 647	3.53 588	8.71 453	244	1.28 547	9.99 942	2
10740	59	8.71 638	242	3.53 647	3.53 588	8.71 697	243	1.28 303	9.99 941	1
10800	60	8.71 880		3.53 647	3.53 588	8.71 940		1.28 060	9.99 940	0
		L. Cos.	d.			L. Cot.	c. d.	L. Tan.	L. Sin.	'

	L. Sin.	d.	L. Tan.	c.d.	L. Cot.	L. Cos.		P. P.
0	8.71 880		8.71 940		1.28 060	9.99 940	60	
1	8.72 120	240	8.72 181	241	1.27 819	9.99 940	59	
2	8.72 359	239	8.72 420	239	1.27 580	9.99 939	58	241 239 237 236 234
3	8.72 597	238	8.72 659	239	1.27 341	9.99 938	57	1 24.1 23.9 23.7 23.6 23.4
4	8.72 834	237	8.72 896	237	1.27 104	9.99 938	56	2 48.2 47.8 47.4 47.2 46.8
5	8.73 069	235	8.73 132	236	1.26 868	9.99 937	55	3 72.3 71.7 71.1 70.8 70.2
6	8.73 303	234	8.73 366	234	1.26 634	9.99 936	54	4 96.4 95.6 94.8 94.4 93.6
7	8.73 535	232	8.73 600	234	1.26 400	9.99 936	53	5 120.5 119.5 118.5 118.0 117.0
8	8.73 767	230	8.73 832	232	1.26 168	9.99 935	52	6 144.6 143.4 142.2 141.6 140.4
9	8.73 997	229	8.74 063	231	1.25 937	9.99 934	51	7 168.7 167.3 165.9 165.2 163.8
10	8.74 226	228	8.74 292	229	1.25 708	9.99 934	50	8 192.8 191.2 189.6 188.8 187.2
11	8.74 454	226	8.74 521	227	1.25 479	9.99 933	49	9 216.9 215.1 213.3 212.4 210.6
12	8.74 680	226	8.74 748	226	1.25 252	9.99 932	48	
13	8.74 906	224	8.74 974	225	1.25 026	9.99 932	47	1 23.2 23.1 22.9 22.7 22.6
14	8.75 130	223	8.75 199	224	1.24 801	9.99 931	46	2 46.4 46.2 45.8 45.4 45.2
15	8.75 353	222	8.75 423	222	1.24 577	9.99 930	45	3 69.6 69.3 68.7 68.1 67.8
16	8.75 575	220	8.75 645	222	1.24 355	9.99 929	44	4 92.8 92.4 91.6 90.8 90.4
17	8.75 795	220	8.75 867	220	1.24 133	9.99 929	43	5 116.0 115.5 114.5 113.5 113.0
18	8.76 015	219	8.76 087	219	1.23 913	9.99 928	42	6 139.2 138.6 137.4 136.2 135.6
19	8.76 234	217	8.76 306	219	1.23 694	9.99 927	41	7 162.4 161.7 160.3 158.9 158.2
20	8.76 451	216	8.76 525	217	1.23 475	9.99 926	40	8 185.6 184.8 183.2 181.6 180.8
21	8.76 667	216	8.76 742	216	1.23 258	9.99 926	39	9 208.8 207.9 206.1 204.3 203.4
22	8.76 883	214	8.76 958	215	1.23 042	9.99 925	38	
23	8.77 097	213	8.77 173	214	1.22 827	9.99 924	37	1 22.4 22.2 22.0 21.9 21.7
24	8.77 310	212	8.77 387	213	1.22 613	9.99 923	36	2 44.8 44.4 44.0 43.8 43.4
25	8.77 522	211	8.77 600	211	1.22 400	9.99 923	35	3 67.2 66.6 66.0 65.7 65.1
26	8.77 733	210	8.77 811	211	1.22 189	9.99 922	34	4 89.6 88.8 88.0 87.6 86.8
27	8.77 943	209	8.78 022	210	1.21 978	9.99 921	33	5 112.0 111.0 110.0 109.5 108.5
28	8.78 152	208	8.78 232	209	1.21 768	9.99 920	32	6 134.4 133.2 132.0 131.4 130.2
29	8.78 360	208	8.78 441	208	1.21 559	9.99 920	31	7 156.8 155.4 154.0 153.3 151.9
30	8.78 568	206	8.78 649	206	1.21 351	9.99 919	30	8 179.2 177.6 176.0 175.2 173.6
31	8.78 774	205	8.78 855	206	1.21 145	9.99 918	29	9 201.6 199.8 198.0 197.1 195.3
32	8.78 979	204	8.79 061	205	1.20 939	9.99 917	28	
33	8.79 183	203	8.79 266	204	1.20 734	9.99 917	27	1 21.6 21.4 21.3 21.1 20.9
34	8.79 386	202	8.79 470	203	1.20 530	9.99 916	26	2 43.2 42.8 42.6 42.2 41.8
35	8.79 588	201	8.79 673	202	1.20 327	9.99 915	25	3 64.8 64.2 63.9 63.3 62.7
36	8.79 789	201	8.79 875	201	1.20 125	9.99 914	24	4 86.4 85.6 85.2 84.4 83.6
37	8.79 990	199	8.80 076	201	1.19 924	9.99 913	23	5 108.0 107.0 106.5 105.5 104.5
38	8.80 189	199	8.80 277	199	1.19 723	9.99 913	22	6 129.6 128.4 127.8 126.6 125.4
39	8.80 388	197	8.80 476	198	1.19 524	9.99 912	21	7 151.2 149.8 149.1 147.7 146.3
40	8.80 585	197	8.80 674	198	1.19 326	9.99 911	20	8 172.8 171.2 170.4 168.8 167.2
41	8.80 782	196	8.80 872	196	1.19 128	9.99 910	19	9 194.4 192.6 191.7 189.9 188.1
42	8.80 978	195	8.81 068	196	1.18 932	9.99 909	18	
43	8.81 173	194	8.81 264	195	1.18 736	9.99 909	17	1 208 206 203 201 199
44	8.81 367	193	8.81 459	194	1.18 541	9.99 908	16	2 20.8 20.6 20.3 20.1 19.9
45	8.81 560	192	8.81 653	193	1.18 347	9.99 907	15	3 41.6 41.2 40.6 40.2 39.8
46	8.81 752	192	8.81 846	192	1.18 154	9.99 906	14	4 62.4 61.8 60.9 60.3 59.7
47	8.81 944	190	8.82 038	192	1.17 962	9.99 905	13	5 83.2 82.4 81.2 80.4 79.6
48	8.82 134	190	8.82 230	190	1.17 770	9.99 904	12	6 104.0 103.0 101.5 100.5 99.5
49	8.82 324	189	8.82 420	190	1.17 580	9.99 904	11	7 124.8 123.6 121.8 120.6 119.4
50	8.82 513	188	8.82 610	189	1.17 390	9.99 903	10	8 145.6 144.2 142.1 140.7 139.3
51	8.82 701	187	8.82 799	188	1.17 201	9.99 902	9	9 166.4 164.8 162.4 160.8 159.2
52	8.82 888	187	8.82 987	188	1.17 013	9.99 901	8	9 187.2 185.4 182.7 180.9 179.1
53	8.83 075	186	8.83 175	186	1.16 825	9.99 900	7	
54	8.83 261	185	8.83 361	186	1.16 639	9.99 899	6	1 198 196 194 192 190
55	8.83 446	184	8.83 547	185	1.16 453	9.99 898	5	2 19.8 19.6 19.4 19.2 19.0
56	8.83 630	183	8.83 732	184	1.16 268	9.99 898	4	3 39.6 39.2 38.8 38.4 38.0
57	8.83 813	183	8.83 916	184	1.16 084	9.99 897	3	4 59.4 58.8 58.2 57.6 57.0
58	8.83 996	181	8.84 100	182	1.15 900	9.99 896	2	5 79.2 78.4 77.6 76.8 76.0
59	8.84 177	181	8.84 282	182	1.15 718	9.99 895	1	6 99.0 98.0 97.0 96.0 95.0
60	8.84 358		8.84 464		1.15 536	9.99 894	0	7 118.8 117.6 116.4 115.2 114.0
	L. Cos.	d.	L. Cot.	c. d.	L. Tan.	L. Sin.		P. P.



'	L. Sin.	d.	L. Tan.	c.d.	L. Cot.	L. Cos.		P. P.
0	8.84 358		8.84 464		1.15 536	9.99 894	60	
1	8.84 539	181	8.84 646	182	1.15 354	9.99 893	59	182 181 180 179 178
2	8.84 718	179	8.84 826	180	1.15 174	9.99 892	58	18.2 18.1 18.0 17.9 17.8
3	8.84 897	179	8.85 006	180	1.14 994	9.99 891	57	36.4 36.2 36.0 35.8 35.6
4	8.85 075	178	8.85 185	179	1.14 815	9.99 891	56	54.6 54.3 54.0 53.7 53.4
5	8.85 252	177	8.85 363	178	1.14 637	9.99 890	55	72.8 72.4 72.0 71.6 71.2
6	8.85 429	177	8.85 540	177	1.14 460	9.99 889	54	91.0 90.5 90.0 89.5 89.0
7	8.85 605	176	8.85 717	177	1.14 283	9.99 888	53	109.2 108.6 108.0 107.4 106.8
8	8.85 780	175	8.85 893	176	1.14 107	9.99 887	52	127.4 126.7 126.0 125.3 124.6
9	8.85 955	175	8.86 069	176	1.13 931	9.99 886	51	145.6 144.8 144.0 143.2 142.4
		173		174				163.8 162.9 162.0 161.1 160.2
10	8.86 128	173	8.86 243	174	1.13 757	9.99 885	50	
11	8.86 301	173	8.86 417	174	1.13 583	9.99 884	49	177 176 175 174 173
12	8.86 474	171	8.86 591	172	1.13 409	9.99 883	48	17.7 17.6 17.5 17.4 17.3
13	8.86 645	171	8.86 763	172	1.13 237	9.99 882	47	35.4 35.2 35.0 34.8 34.6
14	8.86 816	171	8.86 935	171	1.13 065	9.99 881	46	53.1 52.8 52.5 52.2 51.9
15	8.86 987	169	8.87 106	171	1.12 894	9.99 880	45	70.8 70.4 70.0 69.6 69.2
16	8.87 156	169	8.87 277	170	1.12 723	9.99 879	44	88.5 88.0 87.5 87.0 86.5
17	8.87 325	169	8.87 447	169	1.12 553	9.99 879	43	106.2 105.6 105.0 104.4 103.8
18	8.87 494	167	8.87 616	169	1.12 384	9.99 878	42	123.9 123.2 122.5 121.8 121.1
19	8.87 661	168	8.87 785	168	1.12 215	9.99 877	41	141.6 140.8 140.0 139.2 138.4
20	8.87 829	166	8.87 953	167	1.12 047	9.99 876	40	159.3 158.4 157.5 156.6 155.7
21	8.87 995	166	8.88 120	167	1.11 880	9.99 875	39	
22	8.88 161	165	8.88 287	166	1.11 713	9.99 874	38	172 171 170 169 168
23	8.88 326	164	8.88 453	165	1.11 547	9.99 873	37	17.2 17.1 17.0 16.9 16.8
24	8.88 490	164	8.88 618	165	1.11 382	9.99 872	36	34.4 34.2 34.0 33.8 33.6
25	8.88 654	163	8.88 783	165	1.11 217	9.99 871	35	51.6 51.3 51.0 50.7 50.4
26	8.88 817	163	8.88 948	163	1.11 052	9.99 870	34	68.8 68.4 68.0 67.6 67.2
27	8.88 980	162	8.89 111	163	1.10 889	9.99 869	33	86.0 85.5 85.0 84.5 84.0
28	8.89 142	162	8.89 274	163	1.10 726	9.99 868	32	103.2 102.6 102.0 101.4 100.8
29	8.89 304	160	8.89 437	161	1.10 563	9.99 867	31	120.4 119.7 119.0 118.3 117.6
30	8.89 464	161	8.89 598	162	1.10 402	9.99 866	30	137.6 136.8 136.0 135.2 134.4
31	8.89 625	159	8.89 760	160	1.10 240	9.99 865	29	154.8 153.9 153.0 152.1 151.2
32	8.89 784	159	8.89 920	160	1.10 080	9.99 864	28	
33	8.89 943	159	8.90 080	160	1.09 920	9.99 863	27	167 166 165 164 163
34	8.90 102	158	8.90 240	159	1.09 760	9.99 862	26	16.7 16.6 16.5 16.4 16.3
35	8.90 260	157	8.90 399	158	1.09 601	9.99 861	25	33.4 33.2 33.0 32.8 32.6
36	8.90 417	157	8.90 557	158	1.09 443	9.99 860	24	50.1 49.8 49.5 49.2 48.9
37	8.90 574	156	8.90 715	157	1.09 285	9.99 859	23	66.8 66.4 66.0 65.6 65.2
38	8.90 730	155	8.90 872	157	1.09 128	9.99 858	22	83.5 83.0 82.5 82.0 81.5
39	8.90 885	155	8.91 029	156	1.08 971	9.99 857	21	100.2 99.6 99.0 98.4 97.8
40	8.91 040	155	8.91 185	155	1.08 815	9.99 856	20	116.9 116.2 115.5 114.8 114.1
41	8.91 195	154	8.91 340	155	1.08 660	9.99 855	19	133.6 132.8 132.0 131.2 130.4
42	8.91 349	153	8.91 495	155	1.08 505	9.99 854	18	150.3 149.4 148.5 147.6 146.7
43	8.91 502	153	8.91 650	153	1.08 350	9.99 853	17	
44	8.91 655	152	8.91 803	154	1.08 197	9.99 852	16	162 161 160 159 158
45	8.91 807	152	8.91 957	153	1.08 043	9.99 851	15	16.2 16.1 16.0 15.9 15.8
46	8.91 959	151	8.92 110	152	1.07 890	9.99 850	14	32.4 32.2 32.0 31.8 31.6
47	8.92 110	151	8.92 262	152	1.07 738	9.99 848	13	48.6 48.3 48.0 47.7 47.4
48	8.92 261	150	8.92 414	151	1.07 586	9.99 847	12	64.8 64.4 64.0 63.6 63.2
49	8.92 411	150	8.92 565	151	1.07 435	9.99 846	11	81.0 80.5 80.0 79.5 79.0
50	8.92 561	149	8.92 716	150	1.07 284	9.99 845	10	97.2 96.6 96.0 95.4 94.8
51	8.92 710	149	8.92 866	150	1.07 134	9.99 844	9	113.4 112.7 112.0 111.3 110.6
52	8.92 859	148	8.93 016	149	1.06 984	9.99 843	8	129.6 128.8 128.0 127.2 126.4
53	8.93 007	147	8.93 165	148	1.06 835	9.99 842	7	145.8 144.9 144.0 143.1 142.2
54	8.93 154	147	8.93 313	149	1.06 687	9.99 841	6	
55	8.93 301	147	8.93 462	147	1.06 538	9.99 840	5	157 156 155 154 153
56	8.93 448	146	8.93 609	147	1.06 391	9.99 839	4	31.4 31.2 31.0 30.8 30.6
57	8.93 594	146	8.93 756	147	1.06 244	9.99 838	3	47.1 46.8 46.5 46.2 45.9
58	8.93 740	145	8.93 903	146	1.06 097	9.99 837	2	62.8 62.4 62.0 61.6 61.2
59	8.93 885	145	8.94 049	146	1.05 951	9.99 836	1	78.5 78.0 77.5 77.0 76.5
60	8.94 030		8.94 195		1.05 805	9.99 834	0	94.2 93.6 93.0 92.4 91.8
								109.9 109.2 108.5 107.8 107.1
								125.6 124.8 124.0 123.2 122.4
								141.3 140.4 139.5 138.6 137.7
								152 151 150 149 148
								15.2 15.1 15.0 14.9 14.8
								30.4 30.2 30.0 29.8 29.6
								45.6 45.3 45.0 44.7 44.4
								60.8 60.4 60.0 59.6 59.2
								75.0 75.5 75.0 74.5 74.0
								91.2 90.6 90.0 89.4 88.8
								106.4 105.7 105.0 104.3 103.6
								121.6 120.8 120.0 119.2 118.4
								136.8 135.9 135.0 134.1 133.2
'	L. Cos.	d.	L. Cot.	c.d.	L. Tan.	L. Sin.	'	P. P.

	L. Sin.	d.	L. Tan.	c.d.	L. Cot.	L. Cos.		P. P.
0	8.94 030		8.94 195		1.05 805	9.99 834	60	
1	8.94 174	144	8.94 340	145	1.05 660	9.99 833	59	
2	8.94 317	143	8.94 485	145	1.05 515	9.99 832	58	147 146 145 144
3	8.94 461	144	8.94 630	145	1.05 370	9.99 831	57	1 14.7 14.6 14.5 14.4
4	8.94 603	142	8.94 773	143	1.05 227	9.99 830	56	2 29.4 29.2 29.0 28.8
5	8.94 746	143	8.94 917	144	1.05 083	9.99 829	55	3 44.1 43.8 43.5 43.2
6	8.94 887	141	8.95 060	143	1.04 940	9.99 828	54	4 58.8 58.4 58.0 57.6
7	8.95 029	142	8.95 202	142	1.04 798	9.99 827	53	5 73.5 73.0 72.5 72.0
8	8.95 170	141	8.95 344	142	1.04 656	9.99 825	52	6 88.2 87.6 87.0 86.4
9	8.95 310	140	8.95 486	142	1.04 514	9.99 824	51	7 102.9 102.2 101.5 100.8
10	8.95 450	140	8.95 627	141	1.04 373	9.99 823	50	8 117.6 116.8 116.0 115.2
11	8.95 589	139	8.95 767	140	1.04 233	9.99 822	49	9 132.3 131.4 130.5 129.6
12	8.95 728	139	8.95 908	141	1.04 092	9.99 821	48	
13	8.95 867	139	8.96 047	139	1.03 953	9.99 820	47	1 143 142 141 140
14	8.96 005	138	8.96 187	140	1.03 813	9.99 819	46	1 14.3 14.2 14.1 14.0
15	8.96 143	138	8.96 325	138	1.03 673	9.99 817	45	2 28.6 28.4 28.2 28.0
16	8.96 280	137	8.96 464	139	1.03 536	9.99 816	44	3 42.9 42.6 42.3 42.0
17	8.96 417	137	8.96 602	138	1.03 398	9.99 815	43	4 57.2 56.8 56.4 56.0
18	8.96 553	136	8.96 739	137	1.03 261	9.99 814	42	5 71.5 71.0 70.5 70.0
19	8.96 689	136	8.96 877	138	1.03 123	9.99 813	41	6 85.8 85.2 84.6 84.0
20	8.96 825	136	8.97 013	136	1.02 987	9.99 812	40	7 100.1 99.4 98.7 98.0
21	8.96 960	135	8.97 150	137	1.02 850	9.99 810	39	8 114.4 113.6 112.8 112.0
22	8.97 095	135	8.97 285	135	1.02 715	9.99 809	38	9 128.7 127.8 126.9 126.0
23	8.97 229	134	8.97 421	136	1.02 579	9.99 808	37	
24	8.97 363	134	8.97 556	135	1.02 444	9.99 807	36	1 139 138 137 136
25	8.97 496	133	8.97 691	135	1.02 309	9.99 806	35	1 13.9 13.8 13.7 13.6
26	8.97 629	133	8.97 825	134	1.02 175	9.99 804	34	2 27.8 27.6 27.4 27.2
27	8.97 762	133	8.97 959	134	1.02 041	9.99 803	33	3 41.7 41.4 41.1 40.8
28	8.97 894	132	8.98 092	133	1.01 908	9.99 802	32	4 55.6 55.2 54.8 54.4
29	8.98 026	132	8.98 225	133	1.01 773	9.99 801	31	5 69.5 69.0 68.5 68.0
30	8.98 157	131	8.98 358	133	1.01 642	9.99 800	30	6 83.4 82.8 82.2 81.6
31	8.98 288	131	8.98 490	132	1.01 510	9.99 798	29	7 97.3 96.6 95.9 95.2
32	8.98 419	130	8.98 622	132	1.01 378	9.99 797	28	8 111.2 110.4 109.6 108.8
33	8.98 549	130	8.98 753	131	1.01 247	9.99 796	27	9 125.1 124.2 123.3 122.4
34	8.98 679	129	8.98 884	131	1.01 116	9.99 795	26	
35	8.98 808	129	8.99 015	131	1.00 985	9.99 793	25	1 135 134 133 132
36	8.98 937	129	8.99 145	130	1.00 855	9.99 792	24	1 13.1 13.0 12.9 12.8
37	8.99 066	129	8.99 275	130	1.00 725	9.99 791	23	2 26.2 26.0 25.8 25.6
38	8.99 194	128	8.99 405	130	1.00 595	9.99 790	22	3 39.3 39.0 38.7 38.4
39	8.99 322	128	8.99 534	129	1.00 466	9.99 788	21	4 52.4 52.0 51.6 51.2
40	8.99 450	128	8.99 662	128	1.00 338	9.99 787	20	5 65.5 65.0 64.5 64.0
41	8.99 577	127	8.99 791	129	1.00 209	9.99 786	19	6 78.6 78.0 77.4 76.8
42	8.99 704	127	8.99 919	128	1.00 081	9.99 785	18	7 91.7 91.0 90.3 89.6
43	8.99 830	126	9.00 046	127	0.99 954	9.99 783	17	8 104.8 104.0 103.2 102.4
44	8.99 956	126	9.00 174	128	0.99 826	9.99 782	16	9 117.9 117.0 116.1 115.2
45	9.00 082	126	9.00 301	127	0.99 699	9.99 781	15	
46	9.00 207	125	9.00 427	126	0.99 573	9.99 780	14	1 127 126 125 124
47	9.00 332	125	9.00 553	126	0.99 447	9.99 778	13	1 12.7 12.6 12.5 12.4
48	9.00 456	124	9.00 679	126	0.99 321	9.99 777	12	2 25.4 25.2 25.0 24.8
49	9.00 581	125	9.00 805	126	0.99 195	9.99 776	11	3 38.1 37.8 37.5 37.2
50	9.00 704	123	9.00 930	125	0.99 070	9.99 775	10	4 50.8 50.4 50.0 49.6
51	9.00 828	124	9.01 055	125	0.98 945	9.99 773	9	5 63.5 63.0 62.5 62.0
52	9.00 951	123	9.01 179	124	0.98 821	9.99 772	8	6 76.2 75.6 75.0 74.4
53	9.01 074	123	9.01 303	124	0.98 697	9.99 771	7	7 88.9 88.2 87.5 86.8
54	9.01 196	122	9.01 427	124	0.98 573	9.99 769	6	8 101.6 100.8 100.0 99.2
55	9.01 318	122	9.01 550	123	0.98 450	9.99 768	5	9 114.3 113.4 112.5 111.6
56	9.01 440	122	9.01 673	123	0.98 327	9.99 767	4	
57	9.01 561	121	9.01 796	123	0.98 204	9.99 765	3	1 12.7 12.6 12.5 12.4
58	9.01 682	121	9.01 918	122	0.98 082	9.99 764	2	2 25.4 24.4 24.2 24.0
59	9.01 803	121	9.02 040	122	0.97 960	9.99 763	1	3 36.9 36.6 36.3 36.0
60	9.01 923	120	9.02 162	122	0.97 838	9.99 761	0	4 49.2 48.8 48.4 48.0
	L. Cos.	d.	L. Cot.	c. d.	L. Tan.	L. Sin.		P. P.



'	L. Sin.	d.	L. Tan.	c.d.	L. Cot.	L. Cos.		P. P.			
0	9.01 923	120	9.02 162	121	0.97 838	9.99 761	60				
1	9.02 043	120	9.02 283	121	0.97 717	9.99 760	59				
2	9.02 163	120	9.02 404	121	0.97 596	9.99 759	58				
3	9.02 283	119	9.02 525	120	0.97 475	9.99 757	57				
4	9.02 402	118	9.02 645	121	0.97 355	9.99 756	56				
5	9.02 520	119	9.02 766	119	0.97 234	9.99 755	55				
6	9.02 639	118	9.02 885	120	0.97 115	9.99 753	54				
7	9.02 757	117	9.03 005	119	0.96 995	9.99 752	53				
8	9.02 874	118	9.03 124	118	0.96 876	9.99 751	52				
9	9.02 992	117	9.03 242	119	0.96 758	9.99 749	51				
10	9.03 109	117	9.03 361	118	0.96 639	9.99 748	50				
11	9.03 226	116	9.03 479	118	0.96 521	9.99 747	49				
12	9.03 342	116	9.03 597	117	0.96 403	9.99 745	48				
13	9.03 458	116	9.03 714	118	0.96 286	9.99 744	47				
14	9.03 574	116	9.03 832	116	0.96 168	9.99 742	46				
15	9.03 690	115	9.03 948	117	0.96 052	9.99 741	45				
16	9.03 805	115	9.04 065	116	0.95 935	9.99 740	44				
17	9.03 920	114	9.04 181	116	0.95 819	9.99 738	43				
18	9.04 034	115	9.04 297	116	0.95 703	9.99 737	42				
19	9.04 149	113	9.04 413	115	0.95 587	9.99 736	41				
20	9.04 262	114	9.04 528	115	0.95 472	9.99 734	40				
21	9.04 376	114	9.04 643	115	0.95 357	9.99 733	39				
22	9.04 490	113	9.04 758	115	0.95 242	9.99 731	38				
23	9.04 603	112	9.04 873	114	0.95 127	9.99 730	37				
24	9.04 715	113	9.04 987	114	0.95 013	9.99 728	36				
25	9.04 828	112	9.05 101	113	0.94 899	9.99 727	35				
26	9.04 940	112	9.05 214	114	0.94 786	9.99 726	34				
27	9.05 052	112	9.05 328	113	0.94 672	9.99 724	33				
28	9.05 164	111	9.05 441	112	0.94 559	9.99 723	32				
29	9.05 275	111	9.05 553	113	0.94 447	9.99 721	31				
30	9.05 386	111	9.05 666	112	0.94 334	9.99 720	30				
31	9.05 497	110	9.05 778	112	0.94 222	9.99 718	29				
32	9.05 607	110	9.05 890	112	0.94 110	9.99 717	28				
33	9.05 717	110	9.06 002	111	0.93 998	9.99 716	27				
34	9.05 827	110	9.06 113	111	0.93 887	9.99 714	26				
35	9.05 937	109	9.06 224	111	0.93 776	9.99 713	25				
36	9.06 046	109	9.06 335	110	0.93 665	9.99 711	24				
37	9.06 155	109	9.06 445	111	0.93 555	9.99 710	23				
38	9.06 264	108	9.06 556	110	0.93 444	9.99 708	22				
39	9.06 372	109	9.06 666	109	0.93 334	9.99 707	21				
40	9.06 481	108	9.06 775	110	0.93 225	9.99 705	20				
41	9.06 589	107	9.06 885	109	0.93 115	9.99 704	19				
42	9.06 696	108	9.06 994	109	0.93 006	9.99 702	18				
43	9.06 804	107	9.07 103	108	0.92 897	9.99 701	17				
44	9.06 911	107	9.07 211	109	0.92 789	9.99 699	16				
45	9.07 018	106	9.07 320	108	0.92 680	9.99 698	15				
46	9.07 124	107	9.07 428	108	0.92 572	9.99 696	14				
47	9.07 231	106	9.07 536	107	0.92 464	9.99 695	13				
48	9.07 337	105	9.07 643	108	0.92 357	9.99 693	12				
49	9.07 442	106	9.07 751	107	0.92 249	9.99 692	11				
50	9.07 548	105	9.07 858	106	0.92 142	9.99 690	10				
51	9.07 653	105	9.07 964	107	0.92 036	9.99 689	9				
52	9.07 758	105	9.08 071	106	0.91 929	9.99 687	8				
53	9.07 863	105	9.08 177	106	0.91 823	9.99 686	7				
54	9.07 968	104	9.08 283	106	0.91 717	9.99 684	6				
55	9.08 072	104	9.08 389	106	0.91 611	9.99 683	5				
56	9.08 176	104	9.08 495	105	0.91 505	9.99 681	4				
57	9.08 280	103	9.08 600	105	0.91 400	9.99 680	3				
58	9.08 383	103	9.08 705	105	0.91 295	9.99 678	2				
59	9.08 486	103	9.08 810	104	0.91 190	9.99 677	1				
60	9.08 589	103	9.08 914		0.91 086	9.99 675	0				
	L. Cos.	d.	L. Cot.	c. d.	L. Tan.	L. Sin.	'	P. P.			

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994.593.692.7

'	L. Sin.	d.	L. Tan.	c.d.	L. Cot.	L. Cos.		P. P.		
<b>0</b>	9.08 589		9.08 914		0.91 086	9.99 675	<b>60</b>			
1	9.08 692	103	9.09 019	105	0.90 981	9.99 674	59			
2	9.08 795	103	9.09 123	104	0.90 877	9.99 672	58	<b>105</b>	<b>104</b>	<b>103</b>
3	9.08 897	102	9.09 227	104	0.90 773	9.99 670	57	1	10.5	10.4
4	9.08 999	102	9.09 330	103	0.90 670	9.99 669	56	2	21.0	20.8
5	9.09 101	102	9.09 434	104	0.90 566	9.99 667	55	3	31.5	31.2
6	9.09 202	101	9.09 537	103	0.90 463	9.99 666	54	4	42.0	41.6
7	9.09 304	102	9.09 640	103	0.90 360	9.99 664	53	5	52.5	52.0
8	9.09 405	101	9.09 742	102	0.90 258	9.99 663	52	6	63.0	62.4
9	9.09 506	101	9.09 845	103	0.90 155	9.99 661	51	7	73.5	72.8
<b>10</b>	9.09 606	100	9.09 947	102	0.90 053	9.99 659	<b>50</b>	8	84.0	83.2
11	9.09 707	101	9.10 049	102	0.89 951	9.99 658	49	9	94.5	93.6
12	9.09 807	100	9.10 150	101	0.89 850	9.99 656	48			
13	9.09 907	100	9.10 252	102	0.89 748	9.99 655	47	<b>102</b>	<b>101</b>	<b>99</b>
14	9.10 006	99	9.10 353	101	0.89 647	9.99 653	46	1	10.2	10.1
15	9.10 106	100	9.10 454	101	0.89 546	9.99 651	45	2	20.4	20.2
16	9.10 205	99	9.10 555	101	0.89 445	9.99 650	44	3	30.6	30.3
17	9.10 304	99	9.10 656	101	0.89 344	9.99 648	43	4	40.8	40.4
18	9.10 402	98	9.10 756	100	0.89 244	9.99 647	42	5	51.0	50.5
19	9.10 501	99	9.10 856	100	0.89 144	9.99 645	41	6	61.2	60.6
<b>20</b>	9.10 599	98	9.10 956	100	0.89 044	9.99 643	<b>40</b>	7	71.4	70.7
21	9.10 697	98	9.11 056	99	0.88 944	9.99 642	39	8	81.6	80.8
22	9.10 795	98	9.11 155	99	0.88 845	9.99 640	38	9	91.8	90.9
23	9.10 893	98	9.11 254	99	0.88 746	9.99 638	37			
24	9.10 990	97	9.11 353	99	0.88 647	9.99 637	36	<b>98</b>	<b>97</b>	<b>96</b>
25	9.11 087	97	9.11 452	99	0.88 548	9.99 635	35	1	9.8	9.7
26	9.11 184	97	9.11 551	99	0.88 449	9.99 633	34	2	19.6	19.4
27	9.11 281	97	9.11 649	98	0.88 351	9.99 632	33	3	29.4	29.1
28	9.11 377	96	9.11 747	98	0.88 253	9.99 630	32	4	39.2	38.8
29	9.11 474	97	9.11 845	98	0.88 155	9.99 629	31	5	49.0	48.5
<b>30</b>	9.11 570	96	9.11 943	98	0.88 057	9.99 627	<b>30</b>	6	58.8	58.2
31	9.11 666	96	9.12 040	97	0.87 960	9.99 625	29	7	68.6	67.9
32	9.11 761	95	9.12 138	98	0.87 862	9.99 624	28	8	78.4	77.6
33	9.11 857	96	9.12 235	97	0.87 765	9.99 622	27	9	88.2	87.3
34	9.11 952	95	9.12 332	97	0.87 668	9.99 620	26			
35	9.12 047	95	9.12 428	96	0.87 572	9.99 618	25	<b>95</b>	<b>94</b>	<b>93</b>
36	9.12 142	95	9.12 525	97	0.87 475	9.99 617	24	1	9.5	9.4
37	9.12 236	94	9.12 621	96	0.87 379	9.99 615	23	2	19.0	18.8
38	9.12 331	95	9.12 717	96	0.87 283	9.99 613	22	3	28.5	28.2
39	9.12 425	94	9.12 813	96	0.87 187	9.99 612	21	4	38.0	37.6
<b>40</b>	9.12 519	94	9.12 909	96	0.87 091	9.99 610	<b>20</b>	5	47.5	47.0
41	9.12 612	93	9.13 004	95	0.86 996	9.99 608	19	6	57.0	56.4
42	9.12 706	94	9.13 099	95	0.86 901	9.99 607	18	7	66.5	65.8
43	9.12 799	93	9.13 194	95	0.86 806	9.99 605	17	8	76.0	75.2
44	9.12 892	93	9.13 289	95	0.86 711	9.99 603	16	9	85.5	84.6
45	9.12 985	93	9.13 384	95	0.86 616	9.99 601	15			
46	9.13 078	93	9.13 478	94	0.86 522	9.99 600	14	<b>92</b>	<b>91</b>	<b>90</b>
47	9.13 171	93	9.13 573	95	0.86 427	9.99 598	13	1	9.2	9.1
48	9.13 263	92	9.13 667	94	0.86 333	9.99 596	12	2	18.4	18.2
49	9.13 355	92	9.13 761	94	0.86 239	9.99 595	11	3	27.6	27.3
<b>50</b>	9.13 447	92	9.13 854	93	0.86 146	9.99 593	<b>10</b>	4	36.8	36.4
51	9.13 539	92	9.13 948	94	0.86 052	9.99 591	9	5	46.0	45.5
52	9.13 630	91	9.14 041	93	0.85 959	9.99 589	8	6	55.2	54.6
53	9.13 722	92	9.14 134	93	0.85 866	9.99 588	7	7	64.4	63.7
54	9.13 813	91	9.14 227	93	0.85 773	9.99 586	6	8	73.6	72.8
55	9.13 904	90	9.14 320	92	0.85 680	9.99 584	5	9	82.8	81.0
56	9.13 994	91	9.14 412	92	0.85 588	9.99 582	4			
57	9.14 085	91	9.14 504	92	0.85 496	9.99 581	3	<b>92</b>	<b>91</b>	<b>90</b>
58	9.14 175	90	9.14 597	93	0.85 403	9.99 579	2	1	9.2	9.1
59	9.14 266	91	9.14 688	91	0.85 312	9.99 577	1	2	18.4	18.2
<b>60</b>	9.14 356	90	9.14 780	92	0.85 220	9.99 575	<b>0</b>	3	27.6	27.3
	L. Cos.	d.	L. Cot.	c. d.	L. Tan.	L. Sin.	'			
								P. P.		



'	L. Sin.	d.	L. Tan.	c.d.	L. Cot.	L. Cos.		P. P.		
0	9.14 356	89	9.14 780	92	0.85 220	9.99 575	60			
1	9.14 445	90	9.14 872	91	0.85 128	9.99 574	59			
2	9.14 535	89	9.14 963	91	0.85 037	9.99 572	58			
3	9.14 624	90	9.15 054	91	0.84 946	9.99 570	57			
4	9.14 714	89	9.15 145	91	0.84 855	9.99 568	56			
5	9.14 803	88	9.15 236	91	0.84 764	9.99 566	55			
6	9.14 891	89	9.15 327	90	0.84 673	9.99 565	54			
7	9.14 980	89	9.15 417	91	0.84 583	9.99 563	53			
8	9.15 069	88	9.15 508	90	0.84 492	9.99 561	52			
9	9.15 157	88	9.15 598	90	0.84 402	9.99 559	51			
10	9.15 245	88	9.15 688	89	0.84 312	9.99 557	50			
11	9.15 333	88	9.15 777	90	0.84 223	9.99 556	49			
12	9.15 421	87	9.15 867	89	0.84 133	9.99 554	48			
13	9.15 508	88	9.15 956	90	0.84 044	9.99 552	47			
14	9.15 596	87	9.16 046	89	0.83 954	9.99 550	46			
15	9.15 683	87	9.16 135	89	0.83 865	9.99 548	45			
16	9.15 770	87	9.16 224	88	0.83 776	9.99 546	44			
17	9.15 857	87	9.16 312	89	0.83 688	9.99 545	43			
18	9.15 944	86	9.16 401	88	0.83 599	9.99 543	42			
19	9.16 030	86	9.16 489	88	0.83 511	9.99 541	41			
20	9.16 116	87	9.16 577	88	0.83 423	9.99 539	40			
21	9.16 203	86	9.16 665	88	0.83 335	9.99 537	39			
22	9.16 289	85	9.16 753	88	0.83 247	9.99 535	38			
23	9.16 374	86	9.16 841	87	0.83 159	9.99 533	37			
24	9.16 460	85	9.16 928	88	0.83 072	9.99 532	36			
25	9.16 545	86	9.17 016	87	0.82 984	9.99 530	35			
26	9.16 631	85	9.17 103	87	0.82 897	9.99 528	34			
27	9.16 716	85	9.17 190	87	0.82 810	9.99 526	33			
28	9.16 801	85	9.17 277	87	0.82 723	9.99 524	32			
29	9.16 886	84	9.17 363	87	0.82 637	9.99 522	31			
30	9.16 970	85	9.17 450	86	0.82 550	9.99 520	30			
31	9.17 055	84	9.17 536	86	0.82 464	9.99 518	29			
32	9.17 139	84	9.17 622	86	0.82 378	9.99 517	28			
33	9.17 223	84	9.17 708	86	0.82 292	9.99 515	27			
34	9.17 307	84	9.17 794	86	0.82 206	9.99 513	26			
35	9.17 391	83	9.17 880	85	0.82 120	9.99 511	25			
36	9.17 474	84	9.17 965	86	0.82 035	9.99 509	24			
37	9.17 558	83	9.18 051	85	0.81 949	9.99 507	23			
38	9.17 641	83	9.18 136	85	0.81 864	9.99 505	22			
39	9.17 724	83	9.18 221	85	0.81 779	9.99 503	21			
40	9.17 807	83	9.18 306	85	0.81 694	9.99 501	20			
41	9.17 890	83	9.18 391	84	0.81 609	9.99 499	19			
42	9.17 973	82	9.18 475	85	0.81 525	9.99 497	18			
43	9.18 055	82	9.18 560	84	0.81 440	9.99 495	17			
44	9.18 137	83	9.18 644	84	0.81 356	9.99 494	16			
45	9.18 220	82	9.18 728	84	0.81 272	9.99 492	15			
46	9.18 302	81	9.18 812	84	0.81 188	9.99 490	14			
47	9.18 383	82	9.18 896	83	0.81 104	9.99 488	13			
48	9.18 465	82	9.18 979	84	0.81 021	9.99 486	12			
49	9.18 547	81	9.19 063	83	0.80 937	9.99 484	11			
50	9.18 628	81	9.19 146	83	0.80 854	9.99 482	10			
51	9.18 709	81	9.19 229	83	0.80 771	9.99 480	9			
52	9.18 790	81	9.19 312	83	0.80 688	9.99 478	8			
53	9.18 871	81	9.19 395	83	0.80 605	9.99 476	7			
54	9.18 952	81	9.19 478	83	0.80 522	9.99 474	6			
55	9.19 033	80	9.19 561	82	0.80 439	9.99 472	5			
56	9.19 113	80	9.19 643	82	0.80 357	9.99 470	4			
57	9.19 193	80	9.19 725	82	0.80 275	9.99 468	3			
58	9.19 273	80	9.19 807	82	0.80 193	9.99 466	2			
59	9.19 353	80	9.19 889	82	0.80 111	9.99 464	1			
60	9.19 433		9.19 971		0.80 029	9.99 462	0			
	L. Cos.	d.	L. Cot.	c. d.	L. Tan.	L. Sin.	'	P. P.		

	92	91	90
1	9.2	9.1	9.0
2	18.4	18.2	18.0
3	27.6	27.3	27.0
4	36.8	36.4	36.0
5	46.0	45.5	45.0
6	55.2	54.6	54.0
7	64.4	63.7	63.0
8	73.6	72.8	72.0
9	82.8	81.9	81.0

	89	88
1	8.9	8.8
2	17.8	17.6
3	26.7	26.4
4	35.6	35.2
5	44.5	44.0
6	53.4	52.8
7	62.3	61.6
8	71.2	70.4
9	80.1	79.2

	87	86	85
1	8.7	8.6	8.5
2	17.4	17.2	17.0
3	26.1	25.8	25.5
4	34.8	34.4	34.0
5	43.5	43.0	42.5
6	52.2	51.6	51.0
7	60.9	60.2	59.5
8	69.6	68.8	68.0
9	78.3	77.4	76.5

	84	83
1	8.4	8.3
2	16.8	16.6
3	25.2	24.9
4	33.6	33.2
5	42.0	41.5
6	50.4	49.8
7	58.8	58.1
8	67.2	66.4
9	75.6	74.7

	82	81	80
1	8.2	8.1	8.0
2	16.4	16.2	16.0
3	24.6	24.3	24.0
4	32.8	32.4	32.0
5	41.0	40.5	40.0
6	49.2	48.6	48.0
7	57.4	56.7	56.0
8	65.6	64.8	64.0
9	73.8	72.9	72.0

'	L. Sin.	d.	L. Tan.	c.d.	L. Cot.	L. Cos.		P. P.		
0	9.19 433	80	9.19 971	82	0.80 029	9.99 462	60			
1	9.19 513	79	9.20 053	81	0.79 947	9.99 460	59			
2	9.19 592	80	9.20 134	82	0.79 866	9.99 458	58			
3	9.19 672	79	9.20 216	81	0.79 784	9.99 456	57			
4	9.19 751	79	9.20 297	81	0.79 703	9.99 454	56			
5	9.19 830	79	9.20 378	81	0.79 622	9.99 452	55			
6	9.19 909	79	9.20 459	81	0.79 541	9.99 450	54			
7	9.19 988	79	9.20 540	81	0.79 460	9.99 448	53			
8	9.20 067	79	9.20 621	80	0.79 379	9.99 446	52			
9	9.20 145	78	9.20 701	81	0.79 299	9.99 444	51			
10	9.20 223	79	9.20 782	80	0.79 218	9.99 442	50			
11	9.20 302	78	9.20 862	80	0.79 138	9.99 440	49			
12	9.20 380	78	9.20 942	80	0.79 058	9.99 438	48			
13	9.20 458	77	9.21 022	80	0.78 978	9.99 436	47			
14	9.20 535	78	9.21 102	80	0.78 898	9.99 434	46			
15	9.20 613	78	9.21 182	79	0.78 818	9.99 432	45			
16	9.20 691	77	9.21 261	80	0.78 739	9.99 429	44			
17	9.20 768	77	9.21 341	79	0.78 659	9.99 427	43			
18	9.20 845	77	9.21 420	79	0.78 580	9.99 425	42			
19	9.20 922	77	9.21 499	79	0.78 501	9.99 423	41			
20	9.20 999	77	9.21 578	79	0.78 422	9.99 421	40			
21	9.21 076	77	9.21 657	79	0.78 343	9.99 419	39			
22	9.21 153	77	9.21 736	79	0.78 264	9.99 417	38			
23	9.21 229	76	9.21 814	78	0.78 186	9.99 415	37			
24	9.21 306	77	9.21 893	79	0.78 107	9.99 413	36			
25	9.21 382	76	9.21 971	78	0.78 029	9.99 411	35			
26	9.21 458	76	9.22 049	78	0.77 951	9.99 409	34			
27	9.21 534	76	9.22 127	78	0.77 873	9.99 407	33			
28	9.21 610	76	9.22 205	78	0.77 795	9.99 404	32			
29	9.21 685	75	9.22 283	78	0.77 717	9.99 402	31			
30	9.21 761	76	9.22 361	77	0.77 639	9.99 400	30			
31	9.21 836	75	9.22 438	77	0.77 562	9.99 398	29			
32	9.21 912	76	9.22 516	78	0.77 484	9.99 396	28			
33	9.21 987	75	9.22 593	77	0.77 407	9.99 394	27			
34	9.22 062	75	9.22 670	77	0.77 330	9.99 392	26			
35	9.22 137	75	9.22 747	77	0.77 253	9.99 390	25			
36	9.22 211	74	9.22 824	77	0.77 176	9.99 388	24			
37	9.22 286	75	9.22 901	77	0.77 099	9.99 385	23			
38	9.22 361	75	9.22 977	76	0.77 023	9.99 383	22			
39	9.22 435	74	9.23 054	77	0.76 946	9.99 381	21			
40	9.22 509	74	9.23 130	76	0.76 870	9.99 379	20			
41	9.22 583	74	9.23 206	76	0.76 794	9.99 377	19			
42	9.22 657	74	9.23 283	77	0.76 717	9.99 375	18			
43	9.22 731	74	9.23 359	76	0.76 641	9.99 372	17			
44	9.22 805	74	9.23 435	76	0.76 565	9.99 370	16			
45	9.22 878	73	9.23 510	75	0.76 490	9.99 368	15			
46	9.22 952	74	9.23 586	76	0.76 414	9.99 366	14			
47	9.23 025	73	9.23 661	75	0.76 339	9.99 364	13			
48	9.23 098	73	9.23 737	76	0.76 263	9.99 362	12			
49	9.23 171	73	9.23 812	75	0.76 188	9.99 359	11			
50	9.23 244	73	9.23 887	75	0.76 113	9.99 357	10			
51	9.23 317	73	9.23 962	75	0.76 038	9.99 355	9			
52	9.23 390	72	9.24 037	75	0.75 963	9.99 353	8			
53	9.23 462	72	9.24 112	75	0.75 888	9.99 351	7			
54	9.23 535	73	9.24 186	74	0.75 814	9.99 348	6			
55	9.23 607	72	9.24 261	75	0.75 739	9.99 346	5			
56	9.23 679	72	9.24 335	74	0.75 665	9.99 344	4			
57	9.23 752	73	9.24 410	75	0.75 590	9.99 342	3			
58	9.23 823	71	9.24 484	74	0.75 516	9.99 340	2			
59	9.23 895	72	9.24 558	74	0.75 442	9.99 337	1			
60	9.23 967	72	9.24 632	74	0.75 368	9.99 335	0			
	L. Cos.	d.	L. Cot.	c. d.	L. Tan.	L. Sin.	'	P. P.		

	82	81	80
1	8.2	8.1	8.0
2	16.4	16.2	16.0
3	24.6	24.3	24.0
4	32.8	32.4	32.0
5	41.0	40.5	40.0
6	49.2	48.6	48.0
7	57.4	56.7	56.0
8	65.6	64.8	64.0
9	73.8	72.9	72.0

	79	78	77
1	7.9	7.8	7.7
2	15.8	15.6	15.4
3	23.7	23.4	23.1
4	31.6	31.2	30.8
5	39.5	39.0	38.5
6	47.4	46.8	46.2
7	55.3	54.6	53.9
8	63.2	62.4	61.6
9	71.1	70.2	69.3

	76	75	74
1	7.6	7.5	7.4
2	15.2	15.0	14.8
3	22.8	22.5	22.2
4	30.4	30.0	29.6
5	38.0	37.5	37.0
6	45.6	45.0	44.4
7	53.2	52.5	51.8
8	60.8	60.0	59.2
9	68.4	67.5	66.6

	73	72	71
1	7.3	7.2	7.1
2	14.6	14.4	14.2
3	21.9	21.6	21.3
4	29.2	28.8	28.4
5	36.5	36.0	35.5
6	43.8	43.2	42.6
7	51.1	50.4	49.7
8	58.4	57.6	56.8
9	65.7	64.8	63.9

	3	3	3
	79	78	77
0	13.2	13.0	12.8
1	39.5	39.0	38.5
2	65.8	65.0	64.2
3			
	3	3	3
	76	75	74
0	12.7	12.5	12.3
1	38.0	37.5	37.0
2	63.3	62.5	61.7
3			

'	L. Sin.	d.	L. Tan.	c. d.	L. Cot.	L. Cos.	d.		P. P.
0	9.23 967	72	9.24 632	74	0.75 368	9.99 335	2	60	
1	9.24 039	71	9.24 706	73	0.75 294	9.99 333	2	59	74 73 72
2	9.24 110	71	9.24 779	74	0.75 221	9.99 331	3	58	
3	9.24 181	72	9.24 853	73	0.75 147	9.99 328	2	57	1 7.4 7.3 7.2
4	9.24 253	71	9.24 926	74	0.75 074	9.99 326	2	56	2 14.8 14.6 14.4
5	9.24 324	71	9.25 000	73	0.75 000	9.99 324	2	55	3 22.2 21.9 21.6
6	9.24 395	71	9.25 073	73	0.74 927	9.99 322	3	54	4 29.6 29.2 28.8
7	9.24 466	70	9.25 146	73	0.74 854	9.99 319	2	53	5 37.0 36.5 36.0
8	9.24 536	71	9.25 219	73	0.74 781	9.99 317	2	52	6 44.4 43.8 43.2
9	9.24 607	70	9.25 292	73	0.74 708	9.99 315	2	51	7 51.8 51.1 50.4
10	9.24 677	71	9.25 365	72	0.74 635	9.99 313	3	50	8 59.2 58.4 57.6
11	9.24 748	70	9.25 437	73	0.74 563	9.99 310	2	49	9 66.6 65.7 64.8
12	9.24 818	70	9.25 510	72	0.74 490	9.99 308	2	48	71 70 69
13	9.24 888	70	9.25 582	72	0.74 418	9.99 306	2	47	
14	9.24 958	70	9.25 655	73	0.74 345	9.99 304	3	46	1 7.1 7.0 6.9
15	9.25 028	70	9.25 727	72	0.74 273	9.99 301	2	45	2 14.2 14.0 13.8
16	9.25 098	70	9.25 799	72	0.74 201	9.99 299	2	44	3 21.3 21.0 20.7
17	9.25 168	69	9.25 871	72	0.74 129	9.99 297	3	43	4 28.4 28.0 27.6
18	9.25 237	70	9.25 943	72	0.74 057	9.99 294	2	42	5 35.5 35.0 34.5
19	9.25 307	69	9.26 015	71	0.73 985	9.99 292	2	41	6 42.6 42.0 41.4
20	9.25 376	69	9.26 086	72	0.73 914	9.99 290	2	40	7 49.7 49.0 48.3
21	9.25 445	69	9.26 158	71	0.73 842	9.99 288	3	39	8 56.8 56.0 55.2
22	9.25 514	69	9.26 229	71	0.73 771	9.99 285	2	38	9 63.9 63.0 62.1
23	9.25 583	69	9.26 301	71	0.73 699	9.99 283	2	37	68 67 66
24	9.25 652	69	9.26 372	71	0.73 628	9.99 281	3	36	1 6.8 6.7 6.6
25	9.25 721	69	9.26 443	71	0.73 557	9.99 278	2	35	2 13.6 13.4 13.2
26	9.25 790	68	9.26 514	71	0.73 486	9.99 276	2	34	3 20.4 20.1 19.8
27	9.25 858	69	9.26 585	70	0.73 415	9.99 274	3	33	4 27.2 26.8 26.4
28	9.25 927	68	9.26 655	71	0.73 345	9.99 271	2	32	5 34.0 33.5 33.0
29	9.25 995	68	9.26 726	71	0.73 274	9.99 269	2	31	6 40.8 40.2 39.6
30	9.26 063	68	9.26 797	70	0.73 203	9.99 267	3	30	7 47.6 46.9 46.2
31	9.26 131	68	9.26 867	70	0.73 133	9.99 264	2	29	8 54.4 53.6 52.8
32	9.26 199	68	9.26 937	71	0.73 063	9.99 262	2	28	9 61.2 60.3 59.4
33	9.26 267	68	9.27 008	70	0.72 992	9.99 260	3	27	65 3
34	9.26 335	68	9.27 078	70	0.72 922	9.99 257	2	26	1 6.5 0.3
35	9.26 403	67	9.27 148	70	0.72 852	9.99 255	3	25	2 13.0 0.6
36	9.26 470	68	9.27 218	70	0.72 782	9.99 252	2	24	3 19.5 0.9
37	9.26 538	67	9.27 288	69	0.72 712	9.99 250	2	23	4 26.0 1.2
38	9.26 605	67	9.27 357	70	0.72 643	9.99 248	3	22	5 32.5 1.5
39	9.26 672	67	9.27 427	69	0.72 573	9.99 245	2	21	6 39.0 1.8
40	9.26 739	67	9.27 496	70	0.72 504	9.99 243	2	20	7 45.5 2.1
41	9.26 806	67	9.27 566	69	0.72 434	9.99 241	3	19	8 52.0 2.4
42	9.26 873	67	9.27 635	69	0.72 365	9.99 238	2	18	9 58.5 2.7
43	9.26 940	67	9.27 704	69	0.72 296	9.99 236	3	17	
44	9.27 007	66	9.27 773	69	0.72 227	9.99 233	2	16	3 3 3
45	9.27 073	67	9.27 842	69	0.72 158	9.99 231	2	15	74 73 72
46	9.27 140	66	9.27 911	69	0.72 089	9.99 229	3	14	0 12.3 12.2 12.0
47	9.27 206	67	9.27 980	69	0.72 020	9.99 226	2	13	1 37.0 36.5 36.0
48	9.27 273	66	9.28 049	68	0.71 951	9.99 224	3	12	2 61.7 60.8 60.0
49	9.27 339	66	9.28 117	69	0.71 883	9.99 221	2	11	
50	9.27 405	66	9.28 186	68	0.71 814	9.99 219	2	10	3 3 3 3
51	9.27 471	66	9.28 254	69	0.71 746	9.99 217	3	9	71 70 69 68
52	9.27 537	65	9.28 323	68	0.71 677	9.99 214	2	8	0 11.8 11.7 11.5 11.3
53	9.27 602	66	9.28 391	68	0.71 609	9.99 212	3	7	1 35.5 35.0 34.5 34.0
54	9.27 668	66	9.28 459	68	0.71 541	9.99 209	2	6	2 59.2 58.3 57.5 56.7
55	9.27 734	65	9.28 527	68	0.71 473	9.99 207	3	5	
56	9.27 799	65	9.28 595	67	0.71 405	9.99 204	2	4	
57	9.27 864	66	9.28 662	68	0.71 338	9.99 202	2	3	
58	9.27 930	65	9.28 730	68	0.71 270	9.99 200	2	2	
59	9.27 995	65	9.28 798	67	0.71 202	9.99 197	3	1	
60	9.28 060	65	9.28 865	67	0.71 135	9.99 195	2	0	
	L. Cos.	d.	L. Cot.	c. d.	L. Tan.	L. Sin.	d.	'	P. P.



	L. Sin.	d.	L. Tan.	c. d.	L. Cot.	L. Cos.	d.		P. P.
0	9.28 060	65	9.28 865	68	0.71 135	9.99 195	3	60	
1	9.28 125	65	9.28 933	67	0.71 067	9.99 192	2	59	
2	9.28 190	64	9.29 000	67	0.71 000	9.99 190	3	58	68 67 66
3	9.28 254	65	9.29 067	67	0.70 933	9.99 187	2	57	1 6.8 6.7 6.6
4	9.28 319	65	9.29 134	67	0.70 866	9.99 185	3	56	2 13.6 13.4 13.2
5	9.28 384	64	9.29 201	67	0.70 799	9.99 182	2	55	3 20.4 20.1 19.8
6	9.28 448	64	9.29 268	67	0.70 732	9.99 180	3	54	4 27.2 26.8 26.4
7	9.28 512	65	9.29 335	67	0.70 665	9.99 177	2	53	5 34.0 33.5 33.0
8	9.28 577	64	9.29 402	66	0.70 598	9.99 175	3	52	6 40.8 40.2 39.6
9	9.28 641	64	9.29 468	67	0.70 532	9.99 172	2	51	7 47.6 46.9 46.2
10	9.28 705	64	9.29 535	66	0.70 465	9.99 170	3	50	8 54.4 53.6 52.8
11	9.28 769	64	9.29 601	67	0.70 399	9.99 167	2	49	9 61.2 60.3 59.4
12	9.28 833	63	9.29 668	66	0.70 332	9.99 165	3	48	
13	9.28 896	64	9.29 734	66	0.70 266	9.99 162	2	47	65 64 63
14	9.28 960	64	9.29 800	66	0.70 200	9.99 160	3	46	1 6.5 6.4 6.3
15	9.29 024	63	9.29 866	66	0.70 134	9.99 157	2	45	2 13.0 12.8 12.6
16	9.29 087	63	9.29 932	66	0.70 068	9.99 155	3	44	3 19.5 19.2 18.9
17	9.29 150	64	9.29 998	66	0.70 002	9.99 152	2	43	4 26.0 25.6 25.2
18	9.29 214	63	9.30 064	66	0.69 936	9.99 150	3	42	5 32.5 32.0 31.5
19	9.29 277	63	9.30 130	65	0.69 870	9.99 147	2	41	6 39.0 38.4 37.8
20	9.29 340	63	9.30 195	66	0.69 805	9.99 145	3	40	7 45.5 44.8 44.1
21	9.29 403	63	9.30 261	65	0.69 739	9.99 142	2	39	8 52.0 51.2 50.4
22	9.29 466	63	9.30 326	65	0.69 674	9.99 140	3	38	9 58.5 57.6 56.7
23	9.29 529	62	9.30 391	66	0.69 609	9.99 137	2	37	
24	9.29 591	63	9.30 457	65	0.69 543	9.99 135	3	36	62 61 60
25	9.29 654	62	9.30 522	65	0.69 478	9.99 132	2	35	1 6.2 6.1 6.0
26	9.29 716	63	9.30 587	65	0.69 413	9.99 130	3	34	2 12.4 12.2 12.0
27	9.29 779	62	9.30 652	65	0.69 348	9.99 127	2	33	3 18.6 18.3 18.0
28	9.29 841	62	9.30 717	65	0.69 283	9.99 124	3	32	4 24.8 24.4 24.0
29	9.29 903	63	9.30 782	64	0.69 218	9.99 122	2	31	5 31.0 30.5 30.0
30	9.29 966	62	9.30 846	65	0.69 154	9.99 119	3	30	6 37.2 36.6 36.0
31	9.30 028	62	9.30 911	64	0.69 089	9.99 117	2	29	7 43.4 42.7 42.0
32	9.30 090	61	9.30 975	65	0.69 025	9.99 114	3	28	8 49.6 48.8 48.0
33	9.30 151	62	9.31 040	64	0.68 960	9.99 112	2	27	9 55.8 54.9 54.0
34	9.30 213	62	9.31 104	64	0.68 896	9.99 109	3	26	
35	9.30 275	61	9.31 168	65	0.68 832	9.99 106	2	25	59 3
36	9.30 336	62	9.31 233	64	0.68 767	9.99 104	3	24	1 5.9 0.3
37	9.30 398	61	9.31 297	64	0.68 703	9.99 101	2	23	2 11.8 0.6
38	9.30 459	62	9.31 361	64	0.68 639	9.99 099	3	22	3 17.7 0.9
39	9.30 521	61	9.31 425	64	0.68 575	9.99 096	2	21	4 23.6 1.2
40	9.30 582	61	9.31 489	63	0.68 511	9.99 093	3	20	5 29.5 1.5
41	9.30 643	61	9.31 552	64	0.68 448	9.99 091	2	19	6 35.4 1.8
42	9.30 704	61	9.31 616	63	0.68 384	9.99 088	3	18	7 41.3 2.1
43	9.30 765	61	9.31 679	64	0.68 321	9.99 086	2	17	8 47.2 2.4
44	9.30 826	61	9.31 743	63	0.68 257	9.99 083	3	16	9 53.1 2.7
45	9.30 887	60	9.31 806	64	0.68 194	9.99 080	2	15	
46	9.30 947	61	9.31 870	63	0.68 130	9.99 078	3	14	3 3 3
47	9.31 008	60	9.31 933	63	0.68 067	9.99 075	2	13	67 66 65
48	9.31 068	61	9.31 996	63	0.68 004	9.99 072	3	12	0 11.2 11.0 10.8
49	9.31 129	60	9.32 059	63	0.67 941	9.99 070	2	11	1 33.5 33.0 32.5
50	9.31 189	61	9.32 122	63	0.67 878	9.99 067	3	10	2 55.8 55.0 54.2
51	9.31 250	60	9.32 185	63	0.67 815	9.99 064	2	9	
52	9.31 310	60	9.32 248	63	0.67 752	9.99 062	3	8	
53	9.31 370	60	9.32 311	62	0.67 689	9.99 059	2	7	3 3 3
54	9.31 430	60	9.32 373	63	0.67 627	9.99 056	3	6	64 63 62
55	9.31 490	59	9.32 436	62	0.67 564	9.99 054	2	5	0 10.7 10.5 10.3
56	9.31 549	60	9.32 498	63	0.67 502	9.99 051	3	4	1 32.0 31.5 31.0
57	9.31 609	60	9.32 561	62	0.67 439	9.99 048	2	3	2 53.3 52.5 51.7
58	9.31 669	59	9.32 623	62	0.67 377	9.99 046	3	2	
59	9.31 728	60	9.32 685	62	0.67 315	9.99 043	2	1	
60	9.31 788		9.32 747		0.67 253	9.99 040	3	0	
	L. Cos.	d.	L. Cot.	c. d.	L. Tan.	L. Sin.	d.		P. P.



'	L. Sin.	d.	L. Tan.	c. d.	L. Cot.	L. Cos.	d.		P. P.
0	9.31 788	59	9.32 747	63	0.67 253	9.99 040	2	60	
1	9.31 847	60	9.32 810	62	0.67 190	9.99 038	3	59	63 62 61
2	9.31 907	59	9.32 872	61	0.67 128	9.99 035	3	58	
3	9.31 966	59	9.32 933	62	0.67 067	9.99 032	2	57	I 6.3 6.2 6.1
4	9.32 025	59	9.32 995	62	0.67 005	9.99 030	3	56	2 12.6 12.4 12.2
5	9.32 084	59	9.33 057	62	0.66 943	9.99 027	3	55	3 18.9 18.6 18.3
6	9.32 143	59	9.33 119	61	0.66 881	9.99 024	2	54	4 25.2 24.8 24.4
7	9.32 202	59	9.33 180	62	0.66 820	9.99 022	3	53	5 31.5 31.0 30.5
8	9.32 261	58	9.33 242	61	0.66 758	9.99 019	3	52	6 37.8 37.2 36.6
9	9.32 319	59	9.33 303	62	0.66 697	9.99 016	3	51	7 44.1 43.4 42.7
10	9.32 378	59	9.33 365	61	0.66 635	9.99 013	2	50	8 50.4 49.6 48.8
11	9.32 437	58	9.33 426	61	0.66 574	9.99 011	3	49	9 56.7 55.8 54.9
12	9.32 495	58	9.33 487	61	0.66 513	9.99 008	3	48	
13	9.32 553	59	9.33 548	61	0.66 452	9.99 005	3	47	60 59
14	9.32 612	58	9.33 609	61	0.66 391	9.99 002	2	46	I 6.0 5.9
15	9.32 670	58	9.33 670	61	0.66 330	9.99 000	3	45	2 12.0 11.8
16	9.32 728	58	9.33 731	61	0.66 269	9.98 997	3	44	3 18.0 17.7
17	9.32 786	58	9.33 792	61	0.66 208	9.98 994	3	43	4 24.0 23.6
18	9.32 844	58	9.33 853	60	0.66 147	9.98 991	2	42	5 30.0 29.5
19	9.32 902	58	9.33 913	61	0.66 087	9.98 989	3	41	6 36.0 35.4
20	9.32 960	58	9.33 974	60	0.66 026	9.98 986	3	40	7 42.0 41.3
21	9.33 018	57	9.34 034	61	0.65 966	9.98 983	3	39	8 48.0 47.2
22	9.33 075	58	9.34 095	60	0.65 905	9.98 980	2	38	9 54.0 53.1
23	9.33 133	57	9.34 155	60	0.65 845	9.98 978	3	37	
24	9.33 190	58	9.34 215	61	0.65 785	9.98 975	3	36	58 57
25	9.33 248	57	9.34 276	60	0.65 724	9.98 972	3	35	I 5.8 5.7
26	9.33 305	57	9.34 336	60	0.65 664	9.98 969	2	34	2 11.6 11.4
27	9.33 362	58	9.34 396	60	0.65 604	9.98 967	3	33	3 17.4 17.1
28	9.33 420	57	9.34 456	60	0.65 544	9.98 964	3	32	4 23.2 22.8
29	9.33 477	57	9.34 516	60	0.65 484	9.98 961	3	31	5 29.0 28.5
30	9.33 534	57	9.34 576	59	0.65 424	9.98 958	3	30	6 34.8 34.2
31	9.33 591	56	9.34 635	60	0.65 365	9.98 955	2	29	7 40.6 39.9
32	9.33 647	57	9.34 695	60	0.65 305	9.98 953	3	28	8 46.4 45.6
33	9.33 704	57	9.34 755	59	0.65 245	9.98 950	3	27	9 52.2 51.3
34	9.33 761	57	9.34 814	60	0.65 186	9.98 947	3	26	
35	9.33 818	56	9.34 874	59	0.65 126	9.98 944	3	25	56 55 3
36	9.33 874	57	9.34 933	59	0.65 067	9.98 941	3	24	I 5.6 5.5 0.3
37	9.33 931	56	9.34 992	59	0.65 008	9.98 938	2	23	2 11.2 11.0 0.6
38	9.33 987	56	9.35 051	60	0.64 949	9.98 936	3	22	3 16.8 16.5 0.9
39	9.34 043	57	9.35 111	59	0.64 889	9.98 933	3	21	4 22.4 22.0 1.2
40	9.34 100	56	9.35 170	59	0.64 830	9.98 930	3	20	5 28.0 27.5 1.5
41	9.34 156	56	9.35 229	59	0.64 771	9.98 927	3	19	6 33.6 33.0 1.8
42	9.34 212	56	9.35 288	59	0.64 712	9.98 924	3	18	7 39.2 38.5 2.1
43	9.34 268	56	9.35 347	58	0.64 653	9.98 921	2	17	8 44.8 44.0 2.4
44	9.34 324	56	9.35 405	59	0.64 595	9.98 919	3	16	9 50.4 49.5 2.7
45	9.34 380	56	9.35 464	59	0.64 536	9.98 916	3	15	
46	9.34 436	55	9.35 523	58	0.64 477	9.98 913	3	14	
47	9.34 491	56	9.35 581	59	0.64 419	9.98 910	3	13	3 3
48	9.34 547	55	9.35 640	58	0.64 360	9.98 907	3	12	62 61 60
49	9.34 602	56	9.35 698	59	0.64 302	9.98 904	3	11	O 10.3 10.2 10.0
50	9.34 658	55	9.35 757	58	0.64 243	9.98 901	3	10	I 31.0 30.5 30.0
51	9.34 713	56	9.35 815	58	0.64 185	9.98 898	2	9	2 51.7 50.8 50.0
52	9.34 769	55	9.35 873	58	0.64 127	9.98 896	3	8	
53	9.34 824	55	9.35 931	58	0.64 069	9.98 893	3	7	
54	9.34 879	55	9.35 989	58	0.64 011	9.98 890	3	6	3 3
55	9.34 934	55	9.36 047	58	0.63 953	9.98 887	3	5	59 58 57
56	9.34 989	55	9.36 105	58	0.63 895	9.98 884	3	4	O 9.8 9.7 9.5
57	9.35 044	55	9.36 163	58	0.63 837	9.98 881	3	3	I 29.5 29.0 28.5
58	9.35 099	55	9.36 221	58	0.63 779	9.98 878	3	2	2 49.2 48.3 47.5
59	9.35 154	55	9.36 279	57	0.63 721	9.98 875	3	1	
60	9.35 209	55	9.36 336		0.63 664	9.98 872	3	0	
	L. Cos.	d.	L. Cot.	c. d.	L. Tan.	L. Sin.	d.	'	P. P.

	L. Sin.	d.	L. Tan.	c. d.	L. Cot.	L. Cos.	d.		P. P.
0	9.35 209	54	9.36 336	58	0.63 664	9.98 872	3	60	
1	9.35 263	55	9.36 394	58	0.63 606	9.98 869	2	59	58 57 56
2	9.35 318	55	9.36 452	57	0.63 548	9.98 867	3	58	
3	9.35 373	54	9.36 509	57	0.63 491	9.98 864	3	57	1 5.8 5.7 5.6
4	9.35 427	54	9.36 566	57	0.63 434	9.98 861	3	56	2 11.6 11.4 11.2
5	9.35 481	55	9.36 624	57	0.63 376	9.98 858	3	55	3 17.4 17.1 16.8
6	9.35 536	54	9.36 681	57	0.63 319	9.98 855	3	54	4 23.2 22.8 22.4
7	9.35 590	54	9.36 738	57	0.63 262	9.98 852	3	53	5 29.0 28.5 28.0
8	9.35 644	54	9.36 795	57	0.63 205	9.98 849	3	52	6 34.8 34.2 33.6
9	9.35 698	54	9.36 852	57	0.63 148	9.98 846	3	51	7 40.6 39.9 39.2
10	9.35 752	54	9.36 909	57	0.63 091	9.98 843	3	50	8 46.4 45.6 44.8
11	9.35 806	54	9.36 966	57	0.63 034	9.98 840	3	49	9 52.2 51.3 50.4
12	9.35 860	54	9.37 023	57	0.62 977	9.98 837	3	48	
13	9.35 914	54	9.37 080	57	0.62 920	9.98 834	3	47	55 54 53
14	9.35 968	54	9.37 137	56	0.62 863	9.98 831	3	46	1 5.5 5.4 5.3
15	9.36 022	53	9.37 193	57	0.62 807	9.98 828	3	45	2 11.0 10.8 10.6
16	9.36 075	54	9.37 250	56	0.62 750	9.98 825	3	44	3 16.5 16.2 15.9
17	9.36 129	53	9.37 306	57	0.62 694	9.98 822	3	43	4 22.0 21.6 21.2
18	9.36 182	54	9.37 363	56	0.62 637	9.98 819	3	42	5 27.5 27.0 26.5
19	9.36 236	53	9.37 419	57	0.62 581	9.98 816	3	41	6 33.0 32.4 31.8
20	9.36 289	53	9.37 476	56	0.62 524	9.98 813	3	40	7 38.5 37.8 37.1
21	9.36 342	53	9.37 532	56	0.62 468	9.98 810	3	39	8 44.0 43.2 42.4
22	9.36 395	54	9.37 588	56	0.62 412	9.98 807	3	38	9 49.5 48.6 47.7
23	9.36 449	53	9.37 644	56	0.62 356	9.98 804	3	37	52 51
24	9.36 502	53	9.37 700	56	0.62 300	9.98 801	3	36	1 5.2 5.1
25	9.36 555	53	9.37 756	56	0.62 244	9.98 798	3	35	2 10.4 10.2
26	9.36 608	52	9.37 812	56	0.62 188	9.98 795	3	34	3 15.6 15.3
27	9.36 660	53	9.37 868	56	0.62 132	9.98 792	3	33	4 20.8 20.4
28	9.36 713	53	9.37 924	56	0.62 076	9.98 789	3	32	5 26.0 25.5
29	9.36 766	53	9.37 980	55	0.62 020	9.98 786	3	31	6 31.2 30.6
30	9.36 819	52	9.38 035	56	0.61 965	9.98 783	3	30	7 36.4 35.7
31	9.36 871	53	9.38 091	56	0.61 909	9.98 780	3	29	8 41.6 40.8
32	9.36 924	52	9.38 147	55	0.61 853	9.98 777	3	28	9 46.8 45.9
33	9.36 976	52	9.38 202	55	0.61 798	9.98 774	3	27	
34	9.37 028	53	9.38 257	56	0.61 743	9.98 771	3	26	4 3
35	9.37 081	52	9.38 313	55	0.61 687	9.98 768	3	25	1 0.4 0.3
36	9.37 133	52	9.38 368	55	0.61 632	9.98 765	3	24	2 0.8 0.6
37	9.37 185	52	9.38 423	56	0.61 577	9.98 762	3	23	3 1.2 0.9
38	9.37 237	52	9.38 479	55	0.61 521	9.98 759	3	22	4 1.6 1.2
39	9.37 289	52	9.38 534	55	0.61 466	9.98 756	3	21	5 2.0 1.5
40	9.37 341	52	9.38 589	55	0.61 411	9.98 753	3	20	6 2.4 1.8
41	9.37 393	52	9.38 644	55	0.61 356	9.98 750	3	19	7 2.8 2.1
42	9.37 445	52	9.38 699	55	0.61 301	9.98 746	4	18	8 3.2 2.4
43	9.37 497	52	9.38 754	54	0.61 246	9.98 743	3	17	9 3.6 2.7
44	9.37 549	51	9.38 808	55	0.61 192	9.98 740	3	16	
45	9.37 600	52	9.38 863	55	0.61 137	9.98 737	3	15	
46	9.37 652	51	9.38 918	54	0.61 082	9.98 734	3	14	4 4 3 3
47	9.37 703	52	9.38 972	55	0.61 028	9.98 731	3	13	55 54 58 57
48	9.37 755	51	9.39 027	55	0.60 973	9.98 728	3	12	0 6.9 6.8 9.7 9.5
49	9.37 806	52	9.39 082	54	0.60 918	9.98 725	3	11	1 20.6 20.2 29.0 28.5
50	9.37 858	51	9.39 136	54	0.60 864	9.98 722	3	10	2 34.4 33.8 48.3 47.5
51	9.37 909	51	9.39 190	55	0.60 810	9.98 719	4	9	3 48.1 47.2 — —
52	9.37 960	51	9.39 245	54	0.60 755	9.98 715	3	8	
53	9.38 011	51	9.39 299	54	0.60 701	9.98 712	3	7	
54	9.38 062	51	9.39 353	54	0.60 647	9.98 709	3	6	3 3 3
55	9.38 113	51	9.39 407	54	0.60 593	9.98 706	3	5	56 55 54
56	9.38 164	51	9.39 461	54	0.60 539	9.98 703	3	4	
57	9.38 215	51	9.39 515	54	0.60 485	9.98 700	3	3	0 9.3 9.2 9.0
58	9.38 266	51	9.39 569	54	0.60 431	9.98 697	3	2	1 28.0 27.5 27.0
59	9.38 317	51	9.39 623	54	0.60 377	9.98 694	3	1	2 46.7 45.8 45.0
60	9.38 368		9.39 677	54	0.60 323	9.98 690	4	0	
	L. Cos.	d.	L. Cot.	c. d.	L. Tan.	L. Sin.	d.		P. P.



'	L. Sin.	d.	L. Tan.	c. d.	L. Cot.	L. Cos.	d.		P. P.
0	9.38 368	50	9.39 677	54	0.60 323	9.98 690	3	60	
1	9.38 418	51	9.39 731	54	0.60 269	9.98 687	3	59	54 53
2	9.38 469	50	9.39 785	53	0.60 215	9.98 684	3	58	
3	9.38 519	51	9.39 838	54	0.60 162	9.98 681	3	57	1 5.4 5.3
4	9.38 570	50	9.39 892	53	0.60 108	9.98 678	3	56	2 10.8 10.6
5	9.38 620	50	9.39 945	54	0.60 055	9.98 675	3	55	3 16.2 15.9
6	9.38 670	51	9.39 999	53	0.60 001	9.98 671	4	54	4 21.6 21.2
7	9.38 721	50	9.40 052	54	0.59 948	9.98 668	3	53	5 27.0 26.5
8	9.38 771	50	9.40 106	53	0.59 894	9.98 665	3	52	6 32.4 31.8
9	9.38 821	50	9.40 159	53	0.59 841	9.98 662	3	51	7 37.8 37.1
10	9.38 871	50	9.40 212	54	0.59 788	9.98 659	3	50	8 43.2 42.4
11	9.38 921	50	9.40 266	53	0.59 734	9.98 656	4	49	9 48.6 47.7
12	9.38 971	50	9.40 319	53	0.59 681	9.98 652	4	48	
13	9.39 021	50	9.40 372	53	0.59 628	9.98 649	3	47	52 51 50
14	9.39 071	50	9.40 425	53	0.59 575	9.98 646	3	46	1 5.2 5.1 5.0
15	9.39 121	49	9.40 478	53	0.59 522	9.98 643	3	45	2 10.4 10.2 10.0
16	9.39 170	50	9.40 531	53	0.59 469	9.98 640	3	44	3 15.6 15.3 15.0
17	9.39 220	50	9.40 584	52	0.59 416	9.98 636	4	43	4 20.8 20.4 20.0
18	9.39 270	49	9.40 636	53	0.59 364	9.98 633	3	42	5 26.0 25.5 25.0
19	9.39 319	50	9.40 689	53	0.59 311	9.98 630	3	41	6 31.2 30.6 30.0
20	9.39 369	49	9.40 742	53	0.59 258	9.98 627	3	40	7 36.4 35.7 35.0
21	9.39 418	49	9.40 795	52	0.59 205	9.98 623	4	39	8 41.6 40.8 40.0
22	9.39 467	50	9.40 847	53	0.59 153	9.98 620	3	38	9 46.8 45.9 45.0
23	9.39 517	49	9.40 900	52	0.59 100	9.98 617	3	37	
24	9.39 566	49	9.40 952	53	0.59 048	9.98 614	3	36	49 48 47
25	9.39 615	49	9.41 005	52	0.58 995	9.98 610	4	35	1 4.9 4.8 4.7
26	9.39 664	49	9.41 057	52	0.58 943	9.98 607	3	34	2 9.8 9.6 9.4
27	9.39 713	49	9.41 109	52	0.58 891	9.98 604	3	33	3 14.7 14.4 14.1
28	9.39 762	49	9.41 161	53	0.58 839	9.98 601	3	32	4 19.6 19.2 18.8
29	9.39 811	49	9.41 214	52	0.58 786	9.98 597	4	31	5 24.5 24.0 23.5
30	9.39 860	49	9.41 266	52	0.58 734	9.98 594	3	30	6 29.4 28.8 28.2
31	9.39 909	49	9.41 318	52	0.58 682	9.98 591	3	29	7 34.3 33.6 32.9
32	9.39 958	48	9.41 370	52	0.58 630	9.98 588	3	28	8 39.2 38.4 37.6
33	9.40 006	49	9.41 422	52	0.58 578	9.98 584	4	27	9 44.1 43.2 42.3
34	9.40 055	48	9.41 474	52	0.58 526	9.98 581	3	26	
35	9.40 103	49	9.41 526	52	0.58 474	9.98 578	3	25	4 3
36	9.40 152	48	9.41 578	52	0.58 422	9.98 574	4	24	1 0.4 0.3
37	9.40 200	49	9.41 629	51	0.58 371	9.98 571	3	23	2 0.8 0.6
38	9.40 249	48	9.41 681	52	0.58 319	9.98 568	3	22	3 1.2 0.9
39	9.40 297	49	9.41 733	52	0.58 267	9.98 565	3	21	4 1.6 1.2
40	9.40 346	48	9.41 784	51	0.58 216	9.98 561	4	20	5 2.0 1.5
41	9.40 394	48	9.41 836	52	0.58 164	9.98 558	3	19	6 2.4 1.8
42	9.40 442	48	9.41 887	51	0.58 113	9.98 555	3	18	7 2.8 2.1
43	9.40 490	48	9.41 939	52	0.58 061	9.98 551	4	17	8 3.2 2.4
44	9.40 538	48	9.41 990	51	0.58 010	9.98 548	3	16	9 3.6 2.7
45	9.40 586	48	9.42 041	51	0.57 959	9.98 545	3	15	
46	9.40 634	48	9.42 093	52	0.57 907	9.98 541	4	14	4 4 4 4
47	9.40 682	48	9.42 144	51	0.57 856	9.98 538	3	13	54 53 52 51
48	9.40 730	48	9.42 195	51	0.57 805	9.98 535	3	12	1 6.8 6.6 6.5 6.4
49	9.40 778	47	9.42 246	51	0.57 754	9.98 531	4	11	2 20.2 19.9 19.5 19.1
50	9.40 825	48	9.42 297	51	0.57 703	9.98 528	3	10	3 33.8 33.1 32.5 31.9
51	9.40 873	48	9.42 348	51	0.57 652	9.98 525	3	9	4 47.2 46.4 45.5 44.6
52	9.40 921	47	9.42 399	51	0.57 601	9.98 521	4	8	
53	9.40 968	48	9.42 450	51	0.57 550	9.98 518	3	7	3 3
54	9.41 016	47	9.42 501	51	0.57 499	9.98 515	3	6	4 3 3 3
55	9.41 063	48	9.42 552	51	0.57 448	9.98 511	4	5	54 53 52 51
56	9.41 111	47	9.42 603	50	0.57 397	9.98 508	3	4	1 9.0 8.8 8.7 8.5
57	9.41 158	47	9.42 653	51	0.57 347	9.98 505	3	3	2 27.0 26.5 26.0 25.5
58	9.41 205	47	9.42 704	51	0.57 296	9.98 501	4	2	3 45.0 44.2 43.3 42.5
59	9.41 252	48	9.42 755	50	0.57 245	9.98 498	3	1	
60	9.41 300		9.42 805		0.57 195	9.98 494	4	0	
	L. Cos.	d.	L. Cot.	c. d.	L. Tan.	L. Sin.	d.	'	P. P.

	L. Sin.	d.	L. Tan.	c. d.	L. Cot.	L. Cos.	d.		P. P.
0	9.41 300	47	9.42 805	51	0.57 195	9.98 494	3	60	
1	9.41 347	47	9.42 856	50	0.57 144	9.98 491	3	59	51 50 49
2	9.41 394	47	9.42 906	51	0.57 094	9.98 488	4	58	
3	9.41 441	47	9.42 957	50	0.57 043	9.98 484	3	57	1 5.1 5.0 4.9
4	9.41 488	47	9.43 007	50	0.56 993	9.98 481	3	56	2 10.2 10.0 9.8
5	9.41 535	47	9.43 057	51	0.56 943	9.98 477	4	55	3 15.3 15.0 14.7
6	9.41 582	47	9.43 108	50	0.56 892	9.98 474	3	54	4 20.4 20.0 19.6
7	9.41 628	47	9.43 158	50	0.56 842	9.98 471	4	53	5 25.5 25.0 24.5
8	9.41 675	47	9.43 208	50	0.56 792	9.98 467	3	52	6 30.6 30.0 29.4
9	9.41 722	46	9.43 258	50	0.56 742	9.98 464	4	51	7 35.7 35.0 34.3
10	9.41 768	47	9.43 308	50	0.56 692	9.98 460	3	50	8 40.8 40.0 39.2
11	9.41 815	46	9.43 358	50	0.56 642	9.98 457	4	49	9 45.9 45.0 44.1
12	9.41 861	47	9.43 408	50	0.56 592	9.98 453	3	48	
13	9.41 908	46	9.43 458	50	0.56 542	9.98 450	4	47	48 47 46
14	9.41 954	47	9.43 508	50	0.56 492	9.98 447	3	46	1 4.8 4.7 4.6
15	9.42 001	46	9.43 558	49	0.56 442	9.98 443	4	45	2 9.6 9.4 9.2
16	9.42 047	46	9.43 607	50	0.56 393	9.98 440	3	44	3 14.4 14.1 13.8
17	9.42 093	47	9.43 657	50	0.56 343	9.98 436	4	43	4 19.2 18.8 18.4
18	9.42 140	46	9.43 707	49	0.56 293	9.98 433	3	42	5 24.0 23.5 23.0
19	9.42 186	46	9.43 756	50	0.56 244	9.98 429	4	41	6 28.8 28.2 27.6
20	9.42 232	46	9.43 806	49	0.56 194	9.98 426	3	40	7 33.6 32.9 32.2
21	9.42 278	46	9.43 855	50	0.56 145	9.98 422	4	39	8 38.4 37.6 36.8
22	9.42 324	46	9.43 905	49	0.56 095	9.98 419	3	38	9 43.2 42.3 41.4
23	9.42 370	46	9.43 954	50	0.56 046	9.98 415	4	37	
24	9.42 416	45	9.44 004	49	0.55 996	9.98 412	3	36	45 44
25	9.42 461	46	9.44 053	49	0.55 947	9.98 409	4	35	1 4.5 4.4
26	9.42 507	46	9.44 102	49	0.55 898	9.98 405	3	34	2 9.0 8.8
27	9.42 553	46	9.44 151	50	0.55 849	9.98 402	4	33	3 13.5 13.2
28	9.42 599	45	9.44 201	49	0.55 799	9.98 398	3	32	4 18.0 17.6
29	9.42 644	46	9.44 250	49	0.55 750	9.98 395	4	31	5 22.5 22.0
30	9.42 690	45	9.44 299	49	0.55 701	9.98 391	3	30	6 27.0 26.4
31	9.42 735	46	9.44 348	49	0.55 652	9.98 388	4	29	7 31.5 30.8
32	9.42 781	45	9.44 397	49	0.55 603	9.98 384	3	28	8 36.0 35.2
33	9.42 826	46	9.44 446	49	0.55 554	9.98 381	4	27	9 40.5 39.6
34	9.42 872	45	9.44 495	49	0.55 505	9.98 377	3	26	
35	9.42 917	45	9.44 544	48	0.55 456	9.98 373	4	25	4 3
36	9.42 962	46	9.44 592	49	0.55 408	9.98 370	3	24	1 0.4 0.3
37	9.43 008	45	9.44 641	49	0.55 359	9.98 366	4	23	2 0.8 0.6
38	9.43 053	45	9.44 690	48	0.55 310	9.98 363	3	22	3 1.2 0.9
39	9.43 098	45	9.44 738	49	0.55 262	9.98 359	4	21	4 1.6 1.2
40	9.43 143	45	9.44 787	49	0.55 213	9.98 356	3	20	5 2.0 1.5
41	9.43 188	45	9.44 836	48	0.55 164	9.98 352	4	19	6 2.4 1.8
42	9.43 233	45	9.44 884	49	0.55 116	9.98 349	3	18	7 2.8 2.1
43	9.43 278	45	9.44 933	48	0.55 067	9.98 345	4	17	8 3.2 2.4
44	9.43 323	44	9.44 981	48	0.55 019	9.98 342	3	16	9 3.6 2.7
45	9.43 367	45	9.45 029	49	0.54 971	9.98 338	4	15	
46	9.43 412	45	9.45 078	48	0.54 922	9.98 334	3	14	4 4 4 4
47	9.43 457	45	9.45 126	48	0.54 874	9.98 331	4	13	50 49 48 47
48	9.43 502	44	9.45 174	48	0.54 826	9.98 327	3	12	0 6.2 6.1 6.0 5.9
49	9.43 546	45	9.45 222	49	0.54 778	9.98 324	4	11	1 18.8 18.4 18.0 17.6
50	9.43 591	44	9.45 271	48	0.54 729	9.98 320	3	10	2 31.2 30.6 30.0 29.4
51	9.43 635	45	9.45 319	48	0.54 681	9.98 317	4	9	3 43.8 42.9 42.0 41.1
52	9.43 680	44	9.45 367	48	0.54 633	9.98 313	3	8	
53	9.43 724	45	9.45 415	48	0.54 585	9.98 309	4	7	3 3 3 3
54	9.43 769	44	9.45 463	48	0.54 537	9.98 306	3	6	51 50 49 48
55	9.43 813	44	9.45 511	48	0.54 489	9.98 302	4	5	0 8.5 8.3 8.2 8.0
56	9.43 857	44	9.45 559	47	0.54 441	9.98 299	3	4	1 25.5 25.0 24.5 24.0
57	9.43 901	45	9.45 606	48	0.54 394	9.98 295	4	3	2 42.5 41.7 40.8 40.0
58	9.43 946	44	9.45 654	48	0.54 346	9.98 291	3	2	
59	9.43 990	44	9.45 702	48	0.54 298	9.98 288	4	1	
60	9.44 034		9.45 750		0.54 250	9.98 284		0	
	L. Cos.	d.	L. Cot.	c. d.	L. Tan.	L. Sin.	d.		P. P.



'	L. Sin.	d.	L. Tan.	c. d.	L. Cot.	L. Cos.	d.		P. P.
0	9.44 034	44	9.45 730	47	0.54 250	9.98 284	3	60	
1	9.44 078	44	9.45 797	48	0.54 203	9.98 281	3	59	48 47 46
2	9.44 122	44	9.45 845	47	0.54 155	9.98 277	4	58	
3	9.44 166	44	9.45 892	48	0.54 108	9.98 273	4	57	I 4.8 4.7 4.6
4	9.44 210	44	9.45 940	47	0.54 060	9.98 270	3	56	2 9.6 9.4 9.2
5	9.44 253	43	9.45 987	48	0.54 013	9.98 266	4	55	3 14.4 14.1 13.8
6	9.44 297	44	9.46 035	47	0.53 965	9.98 262	4	54	4 19.2 18.8 18.4
7	9.44 341	44	9.46 082	48	0.53 918	9.98 259	3	53	5 24.0 23.5 23.0
8	9.44 385	44	9.46 130	47	0.53 870	9.98 255	4	52	6 28.8 28.2 27.6
9	9.44 428	43	9.46 177	47	0.53 823	9.98 251	4	51	7 33.6 32.9 32.2
10	9.44 472	44	9.46 224	47	0.53 776	9.98 248	3	50	8 38.4 37.6 36.8
11	9.44 516	43	9.46 271	48	0.53 729	9.98 244	4	49	9 43.2 42.3 41.4
12	9.44 559	43	9.46 319	47	0.53 681	9.98 240	4	48	
13	9.44 602	43	9.46 366	47	0.53 634	9.98 237	3	47	45 44 43
14	9.44 646	44	9.46 413	47	0.53 587	9.98 233	4	46	I 4.5 4.4 4.3
15	9.44 689	43	9.46 460	47	0.53 540	9.98 229	4	45	2 9.0 8.8 8.6
16	9.44 733	44	9.46 507	47	0.53 493	9.98 226	3	44	3 13.5 13.2 12.9
17	9.44 776	43	9.46 554	47	0.53 446	9.98 222	4	43	4 18.0 17.6 17.2
18	9.44 819	43	9.46 601	47	0.53 399	9.98 218	4	42	5 22.5 22.0 21.5
19	9.44 862	43	9.46 648	47	0.53 352	9.98 215	3	41	6 27.0 26.4 25.8
20	9.44 905	43	9.46 694	46	0.53 306	9.98 211	4	40	7 31.5 30.8 30.1
21	9.44 948	44	9.46 741	47	0.53 259	9.98 207	4	39	8 36.0 35.2 34.4
22	9.44 992	44	9.46 788	47	0.53 212	9.98 204	3	38	9 40.5 39.6 38.7
23	9.45 035	43	9.46 835	47	0.53 165	9.98 200	4	37	
24	9.45 077	42	9.46 881	46	0.53 119	9.98 196	4	36	42 41
25	9.45 120	43	9.46 928	47	0.53 072	9.98 192	4	35	I 4.2 4.1
26	9.45 163	43	9.46 975	46	0.53 025	9.98 189	3	34	2 8.4 8.2
27	9.45 206	43	9.47 021	46	0.52 979	9.98 185	4	33	3 12.6 12.3
28	9.45 249	43	9.47 068	47	0.52 932	9.98 181	4	32	4 16.8 16.4
29	9.45 292	42	9.47 114	46	0.52 886	9.98 177	4	31	5 21.0 20.5
30	9.45 334	43	9.47 160	47	0.52 840	9.98 174	3	30	6 25.2 24.6
31	9.45 377	42	9.47 207	46	0.52 793	9.98 170	4	29	7 29.4 28.7
32	9.45 419	43	9.47 253	46	0.52 747	9.98 166	4	28	8 33.6 32.8
33	9.45 462	42	9.47 299	47	0.52 701	9.98 162	4	27	9 37.8 36.9
34	9.45 504	43	9.47 346	46	0.52 654	9.98 159	3	26	
35	9.45 547	42	9.47 392	46	0.52 608	9.98 155	4	25	4 3
36	9.45 589	43	9.47 438	46	0.52 562	9.98 151	4	24	I 0.4 0.3
37	9.45 632	42	9.47 484	46	0.52 516	9.98 147	4	23	2 0.8 0.6
38	9.45 674	42	9.47 530	46	0.52 470	9.98 144	3	22	3 1.2 0.9
39	9.45 716	42	9.47 576	46	0.52 424	9.98 140	4	21	4 1.6 1.2
40	9.45 758	43	9.47 622	46	0.52 378	9.98 136	4	20	5 2.0 1.5
41	9.45 801	42	9.47 668	46	0.52 332	9.98 132	4	19	6 2.4 1.8
42	9.45 843	42	9.47 714	46	0.52 286	9.98 129	3	18	7 2.8 2.1
43	9.45 885	42	9.47 760	46	0.52 240	9.98 125	4	17	8 3.2 2.4
44	9.45 927	42	9.47 806	46	0.52 194	9.98 121	4	16	9 3.6 2.7
45	9.45 969	42	9.47 852	45	0.52 148	9.98 117	4	15	
46	9.46 011	42	9.47 897	46	0.52 103	9.98 113	4	14	
47	9.46 053	42	9.47 943	46	0.52 057	9.98 110	3	13	4 4 4 4
48	9.46 095	41	9.47 989	46	0.52 011	9.98 106	4	12	48 47 46 45
49	9.46 136	42	9.48 035	45	0.51 965	9.98 102	4	11	O 6.0 5.9 5.8 5.6
50	9.46 178	42	9.48 080	46	0.51 920	9.98 098	4	10	1 18.0 17.6 17.2 16.9
51	9.46 220	42	9.48 126	45	0.51 874	9.98 094	4	9	2 30.0 29.4 28.8 28.1
52	9.46 262	41	9.48 171	46	0.51 829	9.98 090	4	8	3 42.0 41.1 40.2 39.4
53	9.46 303	42	9.48 217	45	0.51 783	9.98 087	3	7	
54	9.46 345	41	9.48 262	45	0.51 738	9.98 083	4	6	3 3 3 3
55	9.46 386	42	9.48 307	46	0.51 693	9.98 079	4	5	48 47 46 45
56	9.46 428	41	9.48 353	45	0.51 647	9.98 075	4	4	
57	9.46 469	42	9.48 398	45	0.51 602	9.98 071	4	3	O 8.0 7.8 7.7 7.5
58	9.46 511	41	9.48 443	46	0.51 557	9.98 067	4	2	1 24.0 23.5 23.0 22.5
59	9.46 552	42	9.48 489	45	0.51 511	9.98 063	3	1	2 40.0 39.2 38.3 37.5
60	9.46 594		9.48 534		0.51 466	9.98 060		0	
	L. Cos.	d.	L. Cot.	c. d.	L. Tan.	L. Sin.	d.	'	P. P.

'	L. Sin.	d.	L. Tan.	c. d.	L. Cot.	L. Cos.	d.		P. P.
0	9.46 594	41	9.48 534	45	0.51 466	9.98 060	4	60	
1	9.46 633	41	9.48 579	45	0.51 421	9.98 056	4	59	
2	9.46 676	41	9.48 624	45	0.51 376	9.98 052	4	58	45 44 43
3	9.46 717	41	9.48 669	45	0.51 331	9.98 048	4	57	
4	9.46 758	41	9.48 714	45	0.51 286	9.98 044	4	56	I 4.5 4.4 4.3
5	9.46 800	42	9.48 759	45	0.51 241	9.98 040	4	55	2 9.0 8.8 8.6
6	9.46 841	41	9.48 804	45	0.51 196	9.98 036	4	54	3 13.5 13.2 12.9
7	9.46 882	41	9.48 849	45	0.51 151	9.98 032	4	53	4 18.0 17.6 17.2
8	9.46 923	41	9.48 894	45	0.51 106	9.98 029	3	52	5 22.5 22.0 21.5
9	9.46 964	41	9.48 939	45	0.51 061	9.98 025	4	51	6 27.0 26.4 25.8
10	9.47 005	40	9.48 984	45	0.51 016	9.98 021	4	50	7 31.5 30.8 30.1
11	9.47 045	41	9.49 029	44	0.50 971	9.98 017	4	49	8 36.0 35.2 34.4
12	9.47 086	41	9.49 073	44	0.50 927	9.98 013	4	48	9 40.5 39.6 38.7
13	9.47 127	41	9.49 118	45	0.50 882	9.98 009	4	47	
14	9.47 168	41	9.49 163	45	0.50 837	9.98 005	4	46	42 41 40
15	9.47 209	40	9.49 207	45	0.50 793	9.98 001	4	45	
16	9.47 249	41	9.49 252	44	0.50 748	9.97 997	4	44	I 4.2 4.1 4.0
17	9.47 290	40	9.49 296	45	0.50 704	9.97 993	4	43	2 8.4 8.2 8.0
18	9.47 330	41	9.49 341	44	0.50 659	9.97 989	4	42	3 12.6 12.3 12.0
19	9.47 371	40	9.49 385	45	0.50 615	9.97 986	3	41	4 16.8 16.4 16.0
20	9.47 411	41	9.49 430	44	0.50 570	9.97 982	4	40	5 21.0 20.5 20.0
21	9.47 452	40	9.49 474	45	0.50 526	9.97 978	4	39	6 25.2 24.6 24.0
22	9.47 492	41	9.49 519	44	0.50 481	9.97 974	4	38	7 29.4 28.7 28.0
23	9.47 533	40	9.49 563	44	0.50 437	9.97 970	4	37	8 33.6 32.8 32.0
24	9.47 573	40	9.49 607	45	0.50 393	9.97 966	4	36	9 37.8 36.9 36.0
25	9.47 613	41	9.49 652	44	0.50 348	9.97 962	4	35	
26	9.47 654	40	9.49 696	44	0.50 304	9.97 958	4	34	
27	9.47 694	40	9.49 740	44	0.50 260	9.97 954	4	33	39 5 4 3
28	9.47 734	40	9.49 784	44	0.50 216	9.97 950	4	32	I 3.9 0.5 0.4 0.3
29	9.47 774	40	9.49 828	44	0.50 172	9.97 946	4	31	2 7.8 1.0 0.8 0.6
30	9.47 814	40	9.49 872	44	0.50 128	9.97 942	4	30	3 11.7 1.5 1.2 0.9
31	9.47 854	40	9.49 916	44	0.50 084	9.97 938	4	29	4 15.6 2.0 1.6 1.2
32	9.47 894	40	9.49 960	44	0.50 040	9.97 934	4	28	5 19.5 2.5 2.0 1.5
33	9.47 934	40	9.50 004	44	0.49 996	9.97 930	4	27	6 23.4 3.0 2.4 1.8
34	9.47 974	40	9.50 048	44	0.49 952	9.97 926	4	26	7 27.3 3.5 2.8 2.1
35	9.48 014	40	9.50 092	44	0.49 908	9.97 922	4	25	8 31.2 4.0 3.2 2.4
36	9.48 054	40	9.50 136	44	0.49 864	9.97 918	4	24	9 35.1 4.5 3.6 2.7
37	9.48 094	39	9.50 180	44	0.49 820	9.97 914	4	23	
38	9.48 133	39	9.50 223	43	0.49 777	9.97 910	4	22	
39	9.48 173	40	9.50 267	44	0.49 733	9.97 906	4	21	
40	9.48 213	39	9.50 311	44	0.49 689	9.97 902	4	20	
41	9.48 252	40	9.50 355	43	0.49 645	9.97 898	4	19	5 4 4
42	9.48 292	40	9.50 398	44	0.49 602	9.97 894	4	18	43 45 44
43	9.48 332	39	9.50 442	43	0.49 558	9.97 890	4	17	
44	9.48 371	40	9.50 485	44	0.49 515	9.97 886	4	16	I 4.3 5.6 5.5
45	9.48 411	39	9.50 529	43	0.49 471	9.97 882	4	15	2 12.9 16.9 16.5
46	9.48 450	40	9.50 572	44	0.49 428	9.97 878	4	14	3 21.5 28.1 27.5
47	9.48 490	39	9.50 616	43	0.49 384	9.97 874	4	13	4 30.1 39.4 38.5
48	9.48 529	39	9.50 659	44	0.49 341	9.97 870	4	12	5 38.7 — —
49	9.48 568	39	9.50 703	43	0.49 297	9.97 866	4	11	
50	9.48 607	40	9.50 746	43	0.49 254	9.97 861	5	10	
51	9.48 647	39	9.50 789	44	0.49 211	9.97 857	4	9	
52	9.48 686	39	9.50 833	43	0.49 167	9.97 853	4	8	4 3 3
53	9.48 725	39	9.50 876	43	0.49 124	9.97 849	4	7	43 45 44
54	9.48 764	39	9.50 919	43	0.49 081	9.97 845	4	6	
55	9.48 803	39	9.50 962	43	0.49 038	9.97 841	4	5	O 5.4 7.5 7.3
56	9.48 842	39	9.51 005	43	0.48 995	9.97 837	4	4	1 16.1 22.5 22.0
57	9.48 881	39	9.51 048	44	0.48 952	9.97 833	4	3	2 26.9 37.5 36.7
58	9.48 920	39	9.51 092	43	0.48 908	9.97 829	4	2	3 37.6 — —
59	9.48 959	39	9.51 135	43	0.48 865	9.97 825	4	1	4
60	9.48 998	39	9.51 178	43	0.48 822	9.97 821	4	0	
	L. Cos.	d.	L. Cot.	c. d.	L. Tan.	L. Sin.	d.	'	P. P.



'	L. Sin.	d.	L. Tan.	c. d.	L. Cot.	L. Cos.	d.		P. P.
0	9.48 998	39	9.51 178	43	0.48 822	9.97 821	4	60	
1	9.49 037	39	9.51 221	43	0.48 779	9.97 817	4	59	
2	9.49 076	39	9.51 264	43	0.48 736	9.97 812	5	58	
3	9.49 115	38	9.51 306	42	0.48 694	9.97 808	4	57	43 42 41
4	9.49 153	39	9.51 349	43	0.48 651	9.97 804	4	56	1 4.3 4.2 4.1
5	9.49 192	39	9.51 392	43	0.48 608	9.97 800	4	55	2 8.6 8.4 8.2
6	9.49 231	39	9.51 435	43	0.48 565	9.97 796	4	54	3 12.9 12.6 12.3
7	9.49 269	38	9.51 478	42	0.48 522	9.97 792	4	53	4 17.2 16.8 16.4
8	9.49 308	39	9.51 520	42	0.48 480	9.97 788	4	52	5 21.5 21.0 20.5
9	9.49 347	39	9.51 563	43	0.48 437	9.97 784	4	51	6 25.8 25.2 24.6
10	9.49 385	38	9.51 606	42	0.48 394	9.97 779	5	50	7 30.1 29.4 28.7
11	9.49 424	39	9.51 648	42	0.48 352	9.97 775	4	49	8 34.4 33.6 32.8
12	9.49 462	38	9.51 691	43	0.48 309	9.97 771	4	48	9 38.7 37.8 36.9
13	9.49 500	38	9.51 734	43	0.48 266	9.97 767	4	47	
14	9.49 539	39	9.51 776	42	0.48 224	9.97 763	4	46	
15	9.49 577	38	9.51 819	42	0.48 181	9.97 759	4	45	39 38 37
16	9.49 615	39	9.51 861	42	0.48 139	9.97 754	5	44	1 3.9 3.8 3.7
17	9.49 654	38	9.51 903	42	0.48 097	9.97 750	4	43	2 7.8 7.6 7.4
18	9.49 692	38	9.51 946	43	0.48 054	9.97 746	4	42	3 11.7 11.4 11.1
19	9.49 730	38	9.51 988	42	0.48 012	9.97 742	4	41	4 15.6 15.2 14.8
20	9.49 768	38	9.52 031	43	0.47 969	9.97 738	4	40	5 19.5 19.0 18.5
21	9.49 806	38	9.52 073	42	0.47 927	9.97 734	5	39	6 23.4 22.8 22.2
22	9.49 844	38	9.52 115	42	0.47 885	9.97 729	5	38	7 27.3 26.6 25.9
23	9.49 882	38	9.52 157	42	0.47 843	9.97 725	4	37	8 31.2 30.4 29.6
24	9.49 920	38	9.52 200	43	0.47 800	9.97 721	4	36	9 35.1 34.2 33.3
25	9.49 958	38	9.52 242	42	0.47 758	9.97 717	4	35	
26	9.49 996	38	9.52 284	42	0.47 716	9.97 713	4	34	
27	9.50 034	38	9.52 326	42	0.47 674	9.97 708	5	33	36 5 4
28	9.50 072	38	9.52 368	42	0.47 632	9.97 704	4	32	1 3.6 0.5 0.4
29	9.50 110	38	9.52 410	42	0.47 590	9.97 700	4	31	2 7.2 1.0 0.8
30	9.50 148	37	9.52 452	42	0.47 548	9.97 696	5	30	3 10.8 1.5 1.2
31	9.50 185	38	9.52 494	42	0.47 506	9.97 691	4	29	4 14.4 2.0 1.6
32	9.50 223	38	9.52 536	42	0.47 464	9.97 687	4	28	5 18.0 2.5 2.0
33	9.50 261	38	9.52 578	42	0.47 422	9.97 683	4	27	6 21.6 3.0 2.4
34	9.50 298	37	9.52 620	42	0.47 380	9.97 679	4	26	7 25.2 3.5 2.8
35	9.50 336	38	9.52 661	41	0.47 339	9.97 674	5	25	8 28.8 4.0 3.2
36	9.50 374	38	9.52 703	42	0.47 297	9.97 670	4	24	9 32.4 4.5 3.6
37	9.50 411	37	9.52 745	42	0.47 255	9.97 666	4	23	
38	9.50 449	38	9.52 787	42	0.47 213	9.97 662	4	22	
39	9.50 486	37	9.52 829	41	0.47 171	9.97 657	5	21	
40	9.50 523	38	9.52 870	42	0.47 130	9.97 653	4	20	
41	9.50 561	37	9.52 912	41	0.47 088	9.97 649	4	19	5 5 5
42	9.50 598	37	9.52 953	41	0.47 047	9.97 645	4	18	43 42 41
43	9.50 635	37	9.52 995	42	0.47 005	9.97 640	5	17	
44	9.50 673	38	9.53 037	42	0.46 963	9.97 636	4	16	0 4.3 4.2 4.1
45	9.50 710	37	9.53 078	41	0.46 922	9.97 632	4	15	1 12.9 12.6 12.3
46	9.50 747	37	9.53 120	42	0.46 880	9.97 628	4	14	2 21.5 21.0 20.5
47	9.50 784	37	9.53 161	41	0.46 839	9.97 623	5	13	3 30.1 29.4 28.7
48	9.50 821	37	9.53 202	41	0.46 798	9.97 619	4	12	4 38.7 37.8 36.9
49	9.50 858	37	9.53 244	42	0.46 756	9.97 615	4	11	
50	9.50 896	38	9.53 285	41	0.46 715	9.97 610	5	10	
51	9.50 933	37	9.53 327	42	0.46 673	9.97 606	4	9	4 4 4
52	9.50 970	37	9.53 368	41	0.46 632	9.97 602	4	8	43 42 41
53	9.51 007	37	9.53 409	41	0.46 591	9.97 597	5	7	
54	9.51 043	36	9.53 450	41	0.46 550	9.97 593	4	6	0 5.4 5.2 5.1
55	9.51 080	37	9.53 492	42	0.46 508	9.97 589	4	5	1 16.1 15.8 15.4
56	9.51 117	37	9.53 533	41	0.46 467	9.97 584	5	4	2 26.9 26.2 25.6
57	9.51 154	37	9.53 574	41	0.46 426	9.97 580	4	3	3 37.6 36.8 35.9
58	9.51 191	37	9.53 615	41	0.46 385	9.97 576	4	2	
59	9.51 227	36	9.53 656	41	0.46 344	9.97 571	5	1	
60	9.51 264	37	9.53 697	41	0.46 303	9.97 567	4	0	
	L. Cos.	d.	L. Cot.	c. d.	L. Tan.	L. Sin.	d.	'	P. P.



	L. Sin.	d.	L. Tan.	c. d.	L. Cot.	L. Cos.	d.		P. P.
0	9.51 264	37	9.53 697	41	0.46 303	9.97 567	4	60	
1	9.51 301	37	9.53 738	41	0.46 262	9.97 563	5	59	
2	9.51 338	36	9.53 779	41	0.46 221	9.97 558	4	58	41 40 39
3	9.51 374	37	9.53 820	41	0.46 180	9.97 554	4	57	
4	9.51 411	37	9.53 861	41	0.46 139	9.97 550	5	56	1 4.1 4.0 3.9
5	9.51 447	36	9.53 902	41	0.46 098	9.97 545	5	55	2 8.2 8.0 7.8
6	9.51 484	37	9.53 943	41	0.46 057	9.97 541	4	54	3 12.3 12.0 11.7
7	9.51 520	36	9.53 984	41	0.46 016	9.97 536	5	53	4 16.4 16.0 15.6
8	9.51 557	37	9.54 025	41	0.45 975	9.97 532	4	52	5 20.5 20.0 19.5
9	9.51 593	36	9.54 065	41	0.45 935	9.97 528	4	51	6 24.6 24.0 23.4
10	9.51 629	37	9.54 106	41	0.45 894	9.97 523	5	50	7 28.7 28.0 27.3
11	9.51 666	36	9.54 147	41	0.45 853	9.97 519	4	49	8 32.8 32.0 31.2
12	9.51 702	36	9.54 187	41	0.45 813	9.97 515	4	48	9 36.9 36.0 35.1
13	9.51 738	36	9.54 228	41	0.45 772	9.97 510	5	47	
14	9.51 774	37	9.54 269	41	0.45 731	9.97 506	4	46	37 36 35
15	9.51 811	36	9.54 309	41	0.45 691	9.97 501	5	45	
16	9.51 847	36	9.54 350	41	0.45 650	9.97 497	4	44	1 3.7 3.6 3.5
17	9.51 883	36	9.54 390	41	0.45 610	9.97 492	5	43	2 7.4 7.2 7.0
18	9.51 919	36	9.54 431	41	0.45 569	9.97 488	4	42	3 11.1 10.8 10.5
19	9.51 955	36	9.54 471	41	0.45 529	9.97 484	4	41	4 14.8 14.4 14.0
20	9.51 991	36	9.54 512	41	0.45 488	9.97 479	5	40	5 18.5 18.0 17.5
21	9.52 027	36	9.54 552	41	0.45 448	9.97 475	4	39	6 22.2 21.6 21.0
22	9.52 063	36	9.54 593	41	0.45 407	9.97 470	5	38	7 25.9 25.2 24.5
23	9.52 099	36	9.54 633	41	0.45 367	9.97 466	4	37	8 29.6 28.8 28.0
24	9.52 135	36	9.54 673	41	0.45 327	9.97 461	5	36	9 33.3 32.4 31.5
25	9.52 171	36	9.54 714	41	0.45 286	9.97 457	4	35	
26	9.52 207	35	9.54 754	41	0.45 246	9.97 453	4	34	
27	9.52 242	36	9.54 794	41	0.45 206	9.97 448	5	33	34 5 4
28	9.52 278	36	9.54 835	41	0.45 165	9.97 444	4	32	1 3.4 0.5 0.4
29	9.52 314	36	9.54 875	41	0.45 125	9.97 439	5	31	2 6.8 1.0 0.8
30	9.52 350	35	9.54 915	41	0.45 085	9.97 435	4	30	3 10.2 1.5 1.2
31	9.52 385	36	9.54 955	41	0.45 045	9.97 430	5	29	4 13.6 2.0 1.6
32	9.52 421	35	9.54 995	41	0.45 005	9.97 426	4	28	5 17.0 2.5 2.0
33	9.52 456	36	9.55 035	41	0.44 965	9.97 421	5	27	6 20.4 3.0 2.4
34	9.52 492	35	9.55 075	41	0.44 925	9.97 417	4	26	7 23.8 3.5 2.8
35	9.52 527	36	9.55 115	41	0.44 885	9.97 412	5	25	8 27.2 4.0 3.2
36	9.52 563	35	9.55 155	41	0.44 845	9.97 408	4	24	9 30.6 4.5 3.6
37	9.52 598	36	9.55 195	41	0.44 805	9.97 403	5	23	
38	9.52 634	35	9.55 235	41	0.44 765	9.97 399	4	22	
39	9.52 669	36	9.55 275	41	0.44 725	9.97 394	5	21	
40	9.52 705	35	9.55 315	41	0.44 685	9.97 390	4	20	
41	9.52 740	35	9.55 355	41	0.44 645	9.97 385	5	19	5 5 5
42	9.52 775	36	9.55 395	39	0.44 605	9.97 381	4	18	41 40 39
43	9.52 811	35	9.55 434	41	0.44 566	9.97 376	5	17	
44	9.52 846	35	9.55 474	41	0.44 526	9.97 372	4	16	1 4.1 4.0 3.9
45	9.52 881	35	9.55 514	41	0.44 486	9.97 367	5	15	2 12.3 12.0 11.7
46	9.52 916	35	9.55 554	39	0.44 446	9.97 363	4	14	3 20.5 20.0 19.5
47	9.52 951	35	9.55 593	41	0.44 407	9.97 358	5	13	4 28.7 28.0 27.3
48	9.52 986	35	9.55 633	41	0.44 367	9.97 353	4	12	5 36.9 36.0 35.1
49	9.53 021	35	9.55 673	39	0.44 327	9.97 349	5	11	
50	9.53 056	36	9.55 712	41	0.44 288	9.97 344	4	10	
51	9.53 092	34	9.55 752	39	0.44 248	9.97 340	5	9	4 4 4
52	9.53 126	35	9.55 791	41	0.44 209	9.97 335	4	8	41 40 39
53	9.53 161	35	9.55 831	39	0.44 169	9.97 331	5	7	
54	9.53 196	35	9.55 870	41	0.44 130	9.97 326	4	6	1 5.1 5.0 4.9
55	9.53 231	35	9.55 910	39	0.44 090	9.97 322	5	5	2 15.4 15.0 14.6
56	9.53 266	35	9.55 949	41	0.44 051	9.97 317	4	4	3 25.6 25.0 24.4
57	9.53 301	35	9.55 989	39	0.44 011	9.97 312	5	3	4 35.9 35.0 34.1
58	9.53 336	34	9.56 028	39	0.43 972	9.97 308	4	2	
59	9.53 370	35	9.56 067	41	0.43 933	9.97 303	5	1	
60	9.53 405	35	9.56 107	41	0.43 893	9.97 299	4	0	
	L. Cos.	d.	L. Cot.	c. d.	L. Tan.	L. Sin.	d.		P. P.

'	L. Sin.	d.	L. Tan.	c. d.	L. Cot.	L. Cos.	d.		P. P.
<b>0</b>	9.53 405	35	9.56 107	39	0.43 893	9.97 299	5	<b>60</b>	
1	9.53 440	35	9.56 146	39	0.43 854	9.97 294	5	59	
2	9.53 475	35	9.56 185	39	0.43 815	9.97 289	5	58	<b>40 39 38</b>
3	9.53 509	34	9.56 224	40	0.43 776	9.97 283	4	57	I 4.0 3.9 3.8
4	9.53 544	35	9.56 264	39	0.43 736	9.97 280	5	56	2 8.0 7.8 7.6
5	9.53 578	34	9.56 303	39	0.43 697	9.97 276	4	55	3 12.0 11.7 11.4
6	9.53 613	35	9.56 342	39	0.43 658	9.97 271	5	54	4 16.0 15.6 15.2
7	9.53 647	34	9.56 381	39	0.43 619	9.97 266	5	53	5 20.0 19.5 19.0
8	9.53 682	35	9.56 420	39	0.43 580	9.97 262	4	52	6 24.0 23.4 22.8
9	9.53 716	34	9.56 459	39	0.43 541	9.97 257	5	51	7 28.0 27.3 26.6
<b>10</b>	9.53 751	35	9.56 498	39	0.43 502	9.97 252	5	<b>50</b>	8 32.0 31.2 30.4
11	9.53 785	34	9.56 537	39	0.43 463	9.97 248	4	49	9 36.0 35.1 34.2
12	9.53 819	34	9.56 576	39	0.43 424	9.97 243	5	48	
13	9.53 854	35	9.56 615	39	0.43 385	9.97 238	5	47	<b>37 35 34</b>
14	9.53 888	34	9.56 654	39	0.43 346	9.97 234	4	46	I 3.7 3.5 3.4
15	9.53 922	34	9.56 693	39	0.43 307	9.97 229	5	45	2 7.4 7.0 6.8
16	9.53 957	35	9.56 732	39	0.43 268	9.97 224	5	44	3 11.1 10.5 10.2
17	9.53 991	34	9.56 771	39	0.43 229	9.97 220	4	43	4 14.8 14.0 13.6
18	9.54 025	34	9.56 810	39	0.43 190	9.97 215	5	42	5 18.5 17.5 17.0
19	9.54 059	34	9.56 849	39	0.43 151	9.97 210	5	41	6 22.2 21.0 20.4
<b>20</b>	9.54 093	34	9.56 887	38	0.43 113	9.97 206	4	<b>40</b>	7 25.9 24.5 23.8
21	9.54 127	34	9.56 926	39	0.43 074	9.97 201	5	39	8 29.6 28.0 27.2
22	9.54 161	34	9.56 965	39	0.43 035	9.97 196	5	38	9 33.3 31.5 30.6
23	9.54 195	34	9.57 004	39	0.42 996	9.97 192	4	37	
24	9.54 229	34	9.57 042	38	0.42 958	9.97 187	5	36	<b>33 5 4</b>
25	9.54 263	34	9.57 081	39	0.42 919	9.97 182	5	35	I 3.3 0.5 0.4
26	9.54 297	34	9.57 120	39	0.42 880	9.97 178	4	34	2 6.6 1.0 0.8
27	9.54 331	34	9.57 158	38	0.42 842	9.97 173	5	33	3 9.9 1.5 1.2
28	9.54 365	34	9.57 197	39	0.42 803	9.97 168	5	32	4 13.2 2.0 1.6
29	9.54 399	34	9.57 235	38	0.42 765	9.97 163	5	31	5 16.5 2.5 2.0
<b>30</b>	9.54 433	34	9.57 274	39	0.42 726	9.97 159	4	<b>30</b>	6 19.8 3.0 2.4
31	9.54 466	33	9.57 312	38	0.42 688	9.97 154	5	29	7 23.1 3.5 2.8
32	9.54 500	34	9.57 351	39	0.42 649	9.97 149	5	28	8 26.4 4.0 3.2
33	9.54 534	34	9.57 389	38	0.42 611	9.97 145	4	27	9 29.7 4.5 3.6
34	9.54 567	33	9.57 428	39	0.42 572	9.97 140	5	26	
35	9.54 601	34	9.57 466	38	0.42 534	9.97 135	5	25	<b>5 5 5</b>
36	9.54 635	34	9.57 504	38	0.42 496	9.97 130	5	24	<b>40 39 38</b>
37	9.54 668	33	9.57 543	39	0.42 457	9.97 126	4	23	I 4.0 3.9 3.8
38	9.54 702	34	9.57 581	38	0.42 419	9.97 121	5	22	2 12.0 11.7 11.4
39	9.54 735	33	9.57 619	38	0.42 381	9.97 116	5	21	3 20.0 19.5 19.0
<b>40</b>	9.54 769	34	9.57 658	39	0.42 342	9.97 111	5	<b>20</b>	4 28.0 27.3 26.6
41	9.54 802	33	9.57 696	38	0.42 304	9.97 107	4	19	5 36.0 35.1 34.2
42	9.54 836	34	9.57 734	38	0.42 266	9.97 102	5	18	
43	9.54 869	33	9.57 772	38	0.42 228	9.97 097	5	17	<b>5 4 4</b>
44	9.54 903	34	9.57 810	38	0.42 190	9.97 092	5	16	I 3.7 4.9 4.8
45	9.54 936	33	9.57 849	39	0.42 151	9.97 087	5	15	2 12.0 11.7 11.4
46	9.54 969	33	9.57 887	38	0.42 113	9.97 083	4	14	3 20.0 19.5 19.0
47	9.55 003	34	9.57 925	38	0.42 075	9.97 078	5	13	4 28.0 27.3 26.6
48	9.55 036	33	9.57 963	38	0.42 037	9.97 073	5	12	5 36.0 35.1 34.2
49	9.55 069	33	9.58 001	38	0.41 999	9.97 068	5	11	
<b>50</b>	9.55 102	33	9.58 039	38	0.41 961	9.97 063	5	<b>10</b>	<b>5 4 4</b>
51	9.55 136	34	9.58 077	38	0.41 923	9.97 059	4	9	<b>37 39 38</b>
52	9.55 169	33	9.58 115	38	0.41 885	9.97 054	5	8	I 3.7 4.9 4.8
53	9.55 202	33	9.58 153	38	0.41 847	9.97 049	5	7	2 12.0 11.7 11.4
54	9.55 235	33	9.58 191	38	0.41 809	9.97 044	5	6	3 20.0 19.5 19.0
55	9.55 268	33	9.58 229	38	0.41 771	9.97 039	5	5	4 28.0 27.3 26.6
56	9.55 301	33	9.58 267	38	0.41 733	9.97 035	4	4	5 36.0 35.1 34.2
57	9.55 334	33	9.58 304	37	0.41 696	9.97 030	5	3	
58	9.55 367	33	9.58 342	38	0.41 658	9.97 025	5	2	<b>5 4 4</b>
59	9.55 400	33	9.58 380	38	0.41 620	9.97 020	5	1	I 3.7 4.9 4.8
<b>60</b>	9.55 433	33	9.58 418	38	0.41 582	9.97 015	5	<b>0</b>	2 12.0 11.7 11.4
	L. Cos.	d.	L. Cot.	c. d.	L. Tan.	L. Sin.	d.	'	P. P.



'	L. Sin.	d.	L. Tan.	c. d.	L. Cot.	L. Cos.	d.		P. P.
<b>0</b>	9-55 433	33	9-58 418	37	0-41 582	9-97 015	5	<b>60</b>	
<b>1</b>	9-55 466	33	9-58 455	38	0-41 545	9-97 010	5	59	
<b>2</b>	9-55 499	33	9-58 493	38	0-41 507	9-97 005	5	58	
<b>3</b>	9-55 532	33	9-58 531	38	0-41 469	9-97 001	4	57	<b>38 37 36</b>
<b>4</b>	9-55 564	32	9-58 569	37	0-41 431	9-96 996	5	56	1 3.8 3.7 3.6
<b>5</b>	9-55 597	33	9-58 606	38	0-41 394	9-96 991	5	55	2 7.6 7.4 7.2
<b>6</b>	9-55 630	33	9-58 644	37	0-41 356	9-96 986	5	54	3 11.4 11.1 10.8
<b>7</b>	9-55 663	33	9-58 681	37	0-41 319	9-96 981	5	53	4 15.2 14.8 14.4
<b>8</b>	9-55 695	32	9-58 719	38	0-41 281	9-96 976	5	52	5 19.0 18.5 18.0
<b>9</b>	9-55 728	33	9-58 757	37	0-41 243	9-96 971	5	51	6 22.8 22.2 21.6
<b>10</b>	9-55 761	32	9-58 794	38	0-41 206	9-96 966	5	50	7 26.6 25.9 25.2
<b>11</b>	9-55 793	32	9-58 832	37	0-41 168	9-96 962	4	49	8 30.4 29.6 28.8
<b>12</b>	9-55 826	33	9-58 869	37	0-41 131	9-96 957	5	48	9 34.2 33.3 32.4
<b>13</b>	9-55 858	32	9-58 907	38	0-41 093	9-96 952	5	47	
<b>14</b>	9-55 891	33	9-58 944	37	0-41 056	9-96 947	5	46	<b>33 32 31</b>
<b>15</b>	9-55 923	32	9-58 981	38	0-41 019	9-96 942	5	45	
<b>16</b>	9-55 956	33	9-59 019	37	0-40 981	9-96 937	5	44	1 3.3 3.2 3.1
<b>17</b>	9-55 988	32	9-59 056	38	0-40 944	9-96 932	5	43	2 6.6 6.4 6.2
<b>18</b>	9-56 021	33	9-59 094	37	0-40 906	9-96 927	5	42	3 9.9 9.6 9.3
<b>19</b>	9-56 053	32	9-59 131	38	0-40 869	9-96 922	5	41	4 13.2 12.8 12.4
<b>20</b>	9-56 085	33	9-59 168	37	0-40 832	9-96 917	5	40	5 16.5 16.0 15.5
<b>21</b>	9-56 118	32	9-59 205	38	0-40 795	9-96 912	5	39	6 19.8 19.2 18.6
<b>22</b>	9-56 150	33	9-59 243	37	0-40 757	9-96 907	5	38	7 23.1 22.4 21.7
<b>23</b>	9-56 182	32	9-59 280	38	0-40 720	9-96 903	4	37	8 26.4 25.6 24.8
<b>24</b>	9-56 215	33	9-59 317	37	0-40 683	9-96 898	5	36	9 29.7 28.8 27.9
<b>25</b>	9-56 247	32	9-59 354	38	0-40 646	9-96 893	5	35	
<b>26</b>	9-56 279	33	9-59 391	37	0-40 609	9-96 888	5	34	<b>6 5 4</b>
<b>27</b>	9-56 311	32	9-59 429	38	0-40 571	9-96 883	5	33	1 0.6 0.5 0.4
<b>28</b>	9-56 343	33	9-59 466	37	0-40 534	9-96 878	5	32	2 1.2 1.0 0.8
<b>29</b>	9-56 375	32	9-59 503	38	0-40 497	9-96 873	5	31	3 1.8 1.5 1.2
<b>30</b>	9-56 408	33	9-59 540	37	0-40 460	9-96 868	5	30	4 2.4 2.0 1.6
<b>31</b>	9-56 440	32	9-59 577	38	0-40 423	9-96 863	5	29	5 3.0 2.5 2.0
<b>32</b>	9-56 472	33	9-59 614	37	0-40 386	9-96 858	5	28	6 3.6 3.0 2.4
<b>33</b>	9-56 504	32	9-59 651	38	0-40 349	9-96 853	5	27	7 4.2 3.5 2.8
<b>34</b>	9-56 536	33	9-59 688	37	0-40 312	9-96 848	5	26	8 4.8 4.0 3.2
<b>35</b>	9-56 568	32	9-59 725	38	0-40 275	9-96 843	5	25	9 5.4 4.5 3.6
<b>36</b>	9-56 599	33	9-59 762	37	0-40 238	9-96 838	5	24	
<b>37</b>	9-56 631	32	9-59 799	38	0-40 201	9-96 833	5	23	
<b>38</b>	9-56 663	33	9-59 835	37	0-40 163	9-96 828	5	22	
<b>39</b>	9-56 695	32	9-59 872	38	0-40 128	9-96 823	5	21	
<b>40</b>	9-56 727	33	9-59 909	37	0-40 091	9-96 818	5	<b>20</b>	<b>6 5 5</b>
<b>41</b>	9-56 759	32	9-59 946	38	0-40 054	9-96 813	5	19	<b>37 38 37</b>
<b>42</b>	9-56 790	33	9-59 983	37	0-40 017	9-96 808	5	18	0 3.1 3.8 3.7
<b>43</b>	9-56 822	32	9-60 019	38	0-39 981	9-96 803	5	17	1 9.2 11.4 11.1
<b>44</b>	9-56 854	33	9-60 056	37	0-39 944	9-96 798	5	16	2 15.4 19.0 18.5
<b>45</b>	9-56 886	32	9-60 093	38	0-39 907	9-96 793	5	15	3 21.6 26.6 25.9
<b>46</b>	9-56 917	33	9-60 130	37	0-39 870	9-96 788	5	14	4 27.8 34.2 33.3
<b>47</b>	9-56 949	32	9-60 166	38	0-39 834	9-96 783	5	13	5 33.9 — —
<b>48</b>	9-56 980	33	9-60 203	37	0-39 797	9-96 778	5	12	6
<b>49</b>	9-57 012	32	9-60 240	38	0-39 760	9-96 772	6	11	
<b>50</b>	9-57 044	33	9-60 276	37	0-39 724	9-96 767	5	<b>10</b>	<b>5 4 4</b>
<b>51</b>	9-57 075	32	9-60 313	38	0-39 687	9-96 762	5	9	<b>36 38 37</b>
<b>52</b>	9-57 107	33	9-60 349	37	0-39 651	9-96 757	5	8	0 3.6 4.8 4.6
<b>53</b>	9-57 138	32	9-60 386	38	0-39 614	9-96 752	5	7	1 10.8 14.2 13.9
<b>54</b>	9-57 169	33	9-60 422	37	0-39 578	9-96 747	5	6	2 18.0 23.8 23.1
<b>55</b>	9-57 201	32	9-60 459	38	0-39 541	9-96 742	5	5	3 25.2 33.2 32.4
<b>56</b>	9-57 232	33	9-60 495	37	0-39 503	9-96 737	5	4	4 32.4 — —
<b>57</b>	9-57 264	32	9-60 532	38	0-39 468	9-96 732	5	3	5
<b>58</b>	9-57 295	33	9-60 568	37	0-39 432	9-96 727	5	2	
<b>59</b>	9-57 326	32	9-60 605	38	0-39 395	9-96 722	5	1	
<b>60</b>	9-57 358	33	9-60 641	37	0-39 359	9-96 717	5	<b>0</b>	
	L. Cos.	d.	L. Cot.	c. d.	L. Tan.	L. Sin.	d.	'	P. P.



'	L. Sin.	d.	L. Tan.	c. d.	L. Cot.	L. Cos.	d.		P. P.
0	9.57 358	31	9.60 641	36	0.39 359	9.96 717	6	60	
1	9.57 389	31	9.60 677	37	0.39 323	9.96 711	5	59	
2	9.57 420	31	9.60 714	36	0.39 286	9.96 706	5	58	37 36 35
3	9.57 451	31	9.60 750	36	0.39 250	9.96 701	5	57	I 3.7 3.6 3.5
4	9.57 482	31	9.60 786	36	0.39 214	9.96 696	5	56	2 7.4 7.2 7.0
5	9.57 514	32	9.60 823	37	0.39 177	9.96 691	5	55	3 11.1 10.8 10.5
6	9.57 545	31	9.60 859	36	0.39 141	9.96 686	5	54	4 14.8 14.4 14.0
7	9.57 576	31	9.60 895	36	0.39 105	9.96 681	5	53	5 18.5 18.0 17.5
8	9.57 607	31	9.60 931	36	0.39 069	9.96 676	5	52	6 22.2 21.6 21.0
9	9.57 638	31	9.60 967	36	0.39 033	9.96 670	6	51	7 25.9 25.2 24.5
10	9.57 669	31	9.61 004	37	0.38 996	9.96 665	5	50	8 29.6 28.8 28.0
11	9.57 700	31	9.61 040	36	0.38 960	9.96 660	5	49	9 33.3 32.4 31.5
12	9.57 731	31	9.61 076	36	0.38 924	9.96 655	5	48	
13	9.57 762	31	9.61 112	36	0.38 888	9.96 650	5	47	
14	9.57 793	31	9.61 148	36	0.38 852	9.96 645	5	46	32 31 30
15	9.57 824	31	9.61 184	36	0.38 816	9.96 640	5	45	I 3.2 3.1 3.0
16	9.57 855	30	9.61 220	36	0.38 780	9.96 634	6	44	2 6.4 6.2 6.0
17	9.57 885	31	9.61 256	36	0.38 744	9.96 629	5	43	3 9.6 9.3 9.0
18	9.57 916	31	9.61 292	36	0.38 708	9.96 624	5	42	4 12.8 12.4 12.0
19	9.57 947	31	9.61 328	36	0.38 672	9.96 619	5	41	5 16.0 15.5 15.0
20	9.57 978	30	9.61 364	36	0.38 636	9.96 614	5	40	6 19.2 18.6 18.0
21	9.58 008	31	9.61 400	36	0.38 600	9.96 608	6	39	7 22.4 21.7 21.0
22	9.58 039	31	9.61 436	36	0.38 564	9.96 603	5	38	8 25.6 24.8 24.0
23	9.58 070	31	9.61 472	36	0.38 528	9.96 598	5	37	9 28.8 27.9 27.0
24	9.58 101	30	9.61 508	36	0.38 492	9.96 593	5	36	
25	9.58 131	31	9.61 544	35	0.38 456	9.96 588	5	35	
26	9.58 162	31	9.61 579	35	0.38 421	9.96 582	6	34	29 6 5
27	9.58 192	30	9.61 615	36	0.38 385	9.96 577	5	33	I 2.9 0.6 0.5
28	9.58 223	31	9.61 651	36	0.38 349	9.96 572	5	32	2 5.8 1.2 1.0
29	9.58 253	31	9.61 687	35	0.38 313	9.96 567	5	31	3 8.7 1.8 1.5
30	9.58 284	30	9.61 722	36	0.38 278	9.96 562	5	30	4 11.6 2.4 2.0
31	9.58 314	31	9.61 758	36	0.38 242	9.96 556	6	29	5 14.5 3.0 2.5
32	9.58 345	31	9.61 794	36	0.38 206	9.96 551	5	28	6 17.4 3.6 3.0
33	9.58 375	30	9.61 830	35	0.38 170	9.96 546	5	27	7 20.3 4.2 3.5
34	9.58 406	30	9.61 865	36	0.38 135	9.96 541	5	26	8 23.2 4.8 4.0
35	9.58 436	31	9.61 901	35	0.38 099	9.96 535	6	25	9 26.1 5.4 4.5
36	9.58 467	31	9.61 936	35	0.38 064	9.96 530	5	24	
37	9.58 497	30	9.61 972	36	0.38 028	9.96 525	5	23	
38	9.58 527	30	9.62 008	36	0.37 992	9.96 520	5	22	
39	9.58 557	31	9.62 043	35	0.37 957	9.96 514	6	21	
40	9.58 588	30	9.62 079	35	0.37 921	9.96 509	5	20	6 6
41	9.58 618	30	9.62 114	36	0.37 886	9.96 504	5	19	36 35
42	9.58 648	30	9.62 150	35	0.37 850	9.96 498	6	18	0 3.0 2.9
43	9.58 678	31	9.62 185	36	0.37 815	9.96 493	5	17	1 9.0 8.8
44	9.58 709	30	9.62 221	35	0.37 779	9.96 488	5	16	2 15.0 14.6
45	9.58 739	30	9.62 256	36	0.37 744	9.96 483	5	15	3 21.0 20.4
46	9.58 769	30	9.62 292	36	0.37 708	9.96 477	6	14	4 27.0 26.2
47	9.58 799	30	9.62 327	35	0.37 673	9.96 472	5	13	5 33.0 32.1
48	9.58 829	30	9.62 362	35	0.37 638	9.96 467	5	12	
49	9.58 859	30	9.62 398	36	0.37 602	9.96 461	6	11	
50	9.58 889	30	9.62 433	35	0.37 567	9.96 456	5	10	
51	9.58 919	30	9.62 468	35	0.37 532	9.96 451	5	9	5 5 5
52	9.58 949	30	9.62 504	36	0.37 496	9.96 445	6	8	37 36 35
53	9.58 979	30	9.62 539	35	0.37 461	9.96 440	5	7	0 3.7 3.6 3.5
54	9.59 009	30	9.62 574	35	0.37 426	9.96 435	5	6	I 11.1 10.8 10.5
55	9.59 039	30	9.62 609	36	0.37 391	9.96 429	6	5	2 18.5 18.0 17.5
56	9.59 069	29	9.62 645	35	0.37 355	9.96 424	5	4	3 25.9 25.2 24.5
57	9.59 098	30	9.62 680	35	0.37 320	9.96 419	5	3	4 33.3 32.4 31.5
58	9.59 128	30	9.62 715	35	0.37 285	9.96 413	6	2	
59	9.59 158	30	9.62 750	35	0.37 250	9.96 408	5	1	
60	9.59 188	30	9.62 785	35	0.37 215	9.96 403	5	0	
	L. Cos.	d.	L. Cot.	c. d.	L. Tan.	L. Sin.	d.	'	P. P.

'	L. Sin.	d.	L. Tan.	c. d.	L. Cot.	L. Cos.	d.		P. P.
0	9.59 188	30	9.62 785	35	0.37 215	9.96 403	6	60	
1	9.59 218	29	9.62 820	35	0.37 180	9.96 397	5	59	
2	9.59 247	30	9.62 855	35	0.37 145	9.96 392	5	58	
3	9.59 277	30	9.62 890	35	0.37 110	9.96 387	5	57	36 35 34
4	9.59 307	30	9.62 926	36	0.37 074	9.96 381	6	56	I 3.6 3.5 3.4
5	9.59 336	29	9.62 961	35	0.37 039	9.96 376	5	55	2 7.2 7.0 6.8
6	9.59 366	30	9.62 996	35	0.37 004	9.96 370	6	54	3 10.8 10.5 10.2
7	9.59 396	30	9.63 031	35	0.36 969	9.96 365	5	53	4 14.4 14.0 13.6
8	9.59 425	29	9.63 066	35	0.36 934	9.96 360	5	52	5 18.0 17.5 17.0
9	9.59 455	30	9.63 101	35	0.36 899	9.96 354	6	51	6 21.6 21.0 20.4
10	9.59 484	29	9.63 135	34	0.36 865	9.96 349	5	50	7 25.2 24.5 23.8
11	9.59 514	30	9.63 170	35	0.36 830	9.96 343	6	49	8 28.8 28.0 27.2
12	9.59 543	29	9.63 205	35	0.36 795	9.96 338	5	48	9 32.4 31.5 30.6
13	9.59 573	30	9.63 240	35	0.36 760	9.96 333	5	47	
14	9.59 602	29	9.63 275	35	0.36 725	9.96 327	6	46	
15	9.59 632	30	9.63 310	35	0.36 690	9.96 322	5	45	30 29 28
16	9.59 661	29	9.63 345	35	0.36 655	9.96 316	6	44	I 3.0 2.9 2.8
17	9.59 690	29	9.63 379	34	0.36 621	9.96 311	5	43	2 6.0 5.8 5.6
18	9.59 720	30	9.63 414	35	0.36 586	9.96 305	6	42	3 9.0 8.7 8.4
19	9.59 749	29	9.63 449	35	0.36 551	9.96 300	5	41	4 12.0 11.6 11.2
20	9.59 778	30	9.63 484	35	0.36 516	9.96 294	6	40	5 15.0 14.5 14.0
21	9.59 808	29	9.63 519	35	0.36 481	9.96 289	5	39	6 18.0 17.4 16.8
22	9.59 837	29	9.63 553	34	0.36 447	9.96 284	5	38	7 21.0 20.3 19.6
23	9.59 866	29	9.63 588	35	0.36 412	9.96 278	6	37	8 24.0 23.2 22.4
24	9.59 895	29	9.63 623	35	0.36 377	9.96 273	5	36	9 27.0 26.1 25.2
25	9.59 924	29	9.63 657	34	0.36 343	9.96 267	6	35	
26	9.59 954	30	9.63 692	35	0.36 308	9.96 262	5	34	
27	9.59 983	29	9.63 726	34	0.36 274	9.96 256	6	33	6 5
28	9.60 012	29	9.63 761	35	0.36 239	9.96 251	5	32	I 0.6 0.5
29	9.60 041	29	9.63 796	35	0.36 204	9.96 245	6	31	2 1.2 1.0
30	9.60 070	29	9.63 830	35	0.36 170	9.96 240	5	30	3 1.8 1.5
31	9.60 099	29	9.63 865	35	0.36 135	9.96 234	6	29	4 2.4 2.0
32	9.60 128	29	9.63 899	34	0.36 101	9.96 229	5	28	5 3.0 2.5
33	9.60 157	29	9.63 934	35	0.36 066	9.96 223	6	27	6 3.6 3.0
34	9.60 186	29	9.63 968	34	0.36 032	9.96 218	5	26	7 4.2 3.5
35	9.60 215	29	9.64 003	35	0.35 997	9.96 212	6	25	8 4.8 4.0
36	9.60 244	29	9.64 037	34	0.35 963	9.96 207	5	24	9 5.4 4.5
37	9.60 273	29	9.64 072	35	0.35 928	9.96 201	6	23	
38	9.60 302	29	9.64 106	34	0.35 894	9.96 196	5	22	
39	9.60 331	28	9.64 140	34	0.35 860	9.96 190	6	21	
40	9.60 359	29	9.64 175	35	0.35 825	9.96 185	5	20	
41	9.60 388	29	9.64 209	34	0.35 791	9.96 179	6	19	6 6 6
42	9.60 417	29	9.64 243	34	0.35 757	9.96 174	5	18	36 35 34
43	9.60 446	28	9.64 278	35	0.35 722	9.96 168	6	17	
44	9.60 474	29	9.64 312	34	0.35 688	9.96 162	5	16	O 3.0 2.9 2.8
45	9.60 503	29	9.64 346	34	0.35 654	9.96 157	6	15	I 9.0 8.8 8.5
46	9.60 532	29	9.64 381	35	0.35 619	9.96 151	5	14	2 15.0 14.6 14.2
47	9.60 561	28	9.64 415	34	0.35 585	9.96 146	6	13	3 21.0 20.4 19.8
48	9.60 589	29	9.64 449	34	0.35 551	9.96 140	5	12	4 27.0 26.2 25.5
49	9.60 618	28	9.64 483	34	0.35 517	9.96 135	6	11	5 33.0 32.1 31.2
50	9.60 646	29	9.64 517	35	0.35 483	9.96 129	5	10	
51	9.60 675	29	9.64 552	34	0.35 448	9.96 123	6	9	
52	9.60 704	28	9.64 586	34	0.35 414	9.96 118	5	8	5 5
53	9.60 732	29	9.64 620	34	0.35 380	9.96 112	6	7	35 34
54	9.60 761	29	9.64 654	34	0.35 346	9.96 107	5	6	O 3.5 3.4
55	9.60 789	28	9.64 688	34	0.35 312	9.96 101	6	5	I 10.5 10.2
56	9.60 818	28	9.64 722	34	0.35 278	9.96 095	5	4	2 17.5 17.0
57	9.60 846	29	9.64 756	34	0.35 244	9.96 090	6	3	3 24.5 23.8
58	9.60 875	28	9.64 790	34	0.35 210	9.96 084	5	2	4 31.5 30.6
59	9.60 903	28	9.64 824	34	0.35 176	9.96 079	6	1	5
60	9.60 931	28	9.64 858	34	0.35 142	9.96 073	5	0	
	L. Cos.	d.	L. Cot.	c. d.	L. Tan.	L. Sin.	d.	'	P. P.



	L. Sin.	d.	L. Tan.	c. d.	L. Cot.	L. Cos.	d.		P. P.
<b>0</b>	9.60 931	29	9.64 858	34	0.35 142	9.96 073	6	<b>60</b>	
1	9.60 960	28	9.64 892	34	0.35 108	9.96 067	5	59	
2	9.60 988	28	9.64 926	34	0.35 074	9.96 062	6	58	
3	9.61 016	28	9.64 960	34	0.35 040	9.96 056	6	57	
4	9.61 043	29	9.64 994	34	0.35 006	9.96 050	6	56	<b>34 33</b>
5	9.61 073	28	9.65 028	34	0.34 972	9.96 045	5	55	I   3.4 3.3
6	9.61 101	28	9.65 062	34	0.34 938	9.96 039	6	54	2   6.8 6.6
7	9.61 129	29	9.65 096	34	0.34 904	9.96 034	5	53	3   10.2 9.9
8	9.61 158	29	9.65 130	34	0.34 870	9.96 028	6	52	4   13.6 13.2
9	9.61 186	28	9.65 164	34	0.34 836	9.96 022	6	51	5   17.0 16.5
<b>10</b>	9.61 214	28	9.65 197	33	0.34 803	9.96 017	5	<b>50</b>	6   20.4 19.8
11	9.61 242	28	9.65 231	34	0.34 769	9.96 011	6	49	7   23.8 23.1
12	9.61 270	28	9.65 265	34	0.34 735	9.96 005	6	48	8   27.2 26.4
13	9.61 298	28	9.65 299	34	0.34 701	9.96 000	5	47	9   30.6 29.7
14	9.61 326	28	9.65 333	34	0.34 667	9.95 994	6	46	
15	9.61 354	28	9.65 366	33	0.34 634	9.95 988	6	45	
16	9.61 382	28	9.65 400	34	0.34 600	9.95 982	6	44	
17	9.61 411	29	9.65 434	34	0.34 566	9.95 977	5	43	<b>29 28 27</b>
18	9.61 438	27	9.65 467	33	0.34 533	9.95 971	6	42	I   2.9 2.8 2.7
19	9.61 466	28	9.65 501	34	0.34 499	9.95 965	5	41	2   5.8 5.6 5.4
<b>20</b>	9.61 494	28	9.65 535	33	0.34 465	9.95 960	6	<b>40</b>	3   8.7 8.4 8.1
21	9.61 522	28	9.65 568	34	0.34 432	9.95 954	6	39	4   11.6 11.2 10.8
22	9.61 550	28	9.65 602	34	0.34 398	9.95 948	6	38	5   14.5 14.0 13.5
23	9.61 578	28	9.65 636	34	0.34 364	9.95 942	5	37	6   17.4 16.8 16.2
24	9.61 606	28	9.65 669	33	0.34 331	9.95 937	6	36	7   20.3 19.6 18.9
25	9.61 634	28	9.65 703	34	0.34 297	9.95 931	6	35	8   23.2 22.4 21.6
26	9.61 662	28	9.65 736	33	0.34 264	9.95 925	6	34	9   26.1 25.2 24.3
27	9.61 689	27	9.65 770	34	0.34 230	9.95 920	5	33	
28	9.61 717	28	9.65 803	33	0.34 197	9.95 914	6	32	
29	9.61 745	28	9.65 837	34	0.34 163	9.95 908	6	31	
<b>30</b>	9.61 773	28	9.65 870	33	0.34 130	9.95 902	6	<b>30</b>	<b>6 5</b>
31	9.61 800	27	9.65 904	34	0.34 096	9.95 897	5	29	I   0.6 0.5
32	9.61 828	28	9.65 937	33	0.34 063	9.95 891	6	28	2   1.2 1.0
33	9.61 856	28	9.65 971	34	0.34 029	9.95 885	6	27	3   1.8 1.5
34	9.61 883	27	9.66 004	33	0.33 996	9.95 879	6	26	4   2.4 2.0
35	9.61 911	28	9.66 038	34	0.33 962	9.95 873	5	25	5   3.0 2.5
36	9.61 939	28	9.66 071	33	0.33 929	9.95 868	6	24	6   3.6 3.0
37	9.61 966	27	9.66 104	33	0.33 896	9.95 862	6	23	7   4.2 3.5
38	9.61 994	28	9.66 138	34	0.33 862	9.95 856	6	22	8   4.8 4.0
39	9.62 021	27	9.66 171	33	0.33 829	9.95 850	6	21	9   5.4 4.5
<b>40</b>	9.62 049	28	9.66 204	33	0.33 796	9.95 844	6	<b>20</b>	
41	9.62 076	27	9.66 238	34	0.33 762	9.95 839	5	19	
42	9.62 104	28	9.66 271	33	0.33 729	9.95 833	6	18	
43	9.62 131	27	9.66 304	33	0.33 696	9.95 827	6	17	
44	9.62 159	28	9.66 337	33	0.33 663	9.95 821	6	16	
45	9.62 186	27	9.66 371	34	0.33 629	9.95 815	6	15	
46	9.62 214	28	9.66 404	33	0.33 596	9.95 810	5	14	
47	9.62 241	27	9.66 437	33	0.33 563	9.95 804	6	13	
48	9.62 268	27	9.66 470	33	0.33 530	9.95 798	6	12	
49	9.62 296	28	9.66 503	33	0.33 497	9.95 792	6	11	<b>6 6 5</b>
<b>50</b>	9.62 323	27	9.66 537	34	0.33 463	9.95 786	6	<b>10</b>	<b>34 33 34</b>
51	9.62 350	27	9.66 570	33	0.33 430	9.95 780	6	9	O   2.8 2.8 3.4
52	9.62 377	27	9.66 603	33	0.33 397	9.95 775	5	8	1   8.5 8.2 10.2
53	9.62 405	28	9.66 636	33	0.33 364	9.95 769	6	7	2   14.2 13.8 17.0
54	9.62 432	27	9.66 669	33	0.33 331	9.95 763	6	6	3   19.8 19.2 23.8
55	9.62 459	27	9.66 702	33	0.33 298	9.95 757	6	5	4   25.5 24.8 30.6
56	9.62 486	27	9.66 735	33	0.33 265	9.95 751	6	4	5   31.2 30.2 —
57	9.62 513	27	9.66 768	33	0.33 232	9.95 745	6	3	
58	9.62 541	28	9.66 801	33	0.33 199	9.95 739	6	2	
59	9.62 568	27	9.66 834	33	0.33 166	9.95 733	6	1	
<b>60</b>	9.62 595	27	9.66 867	33	0.33 133	9.95 728	5	<b>0</b>	
	L. Cos.	d.	L. Cot.	c. d.	L. Tan.	L. Sin.	d.		P. P.



'	L. Sin.	d.	L. Tan.	c. d.	L. Cot.	L. Cos.	d.		P. P.
0	9.62 505	27	9.66 867	33	0.33 133	9.95 728	6	60	
1	9.62 622	27	9.66 900	33	0.33 100	9.95 722	6	59	
2	9.62 649	27	9.66 933	33	0.33 067	9.95 716	6	58	
3	9.62 676	27	9.66 966	33	0.33 034	9.95 710	6	57	
4	9.62 703	27	9.66 999	33	0.33 001	9.95 704	6	56	33 32
5	9.62 730	27	9.67 032	33	0.32 968	9.95 698	6	55	1 3.3 3.2
6	9.62 757	27	9.67 065	33	0.32 935	9.95 692	6	54	2 6.6 6.4
7	9.62 784	27	9.67 098	33	0.32 902	9.95 686	6	53	3 9.9 9.6
8	9.62 811	27	9.67 131	33	0.32 869	9.95 680	6	52	4 13.2 12.8
9	9.62 838	27	9.67 163	32	0.32 837	9.95 674	6	51	5 16.5 16.0
10	9.62 865	27	9.67 196	33	0.32 804	9.95 668	6	50	6 19.8 19.2
11	9.62 892	27	9.67 229	33	0.32 771	9.95 663	5	49	7 23.1 22.4
12	9.62 918	26	9.67 262	33	0.32 738	9.95 657	6	48	8 26.4 25.6
13	9.62 945	27	9.67 295	33	0.32 705	9.95 651	6	47	9 29.7 28.8
14	9.62 972	27	9.67 327	32	0.32 673	9.95 645	6	46	
15	9.62 999	27	9.67 360	33	0.32 640	9.95 639	6	45	
16	9.63 026	27	9.67 393	33	0.32 607	9.95 633	6	44	
17	9.63 052	26	9.67 426	33	0.32 574	9.95 627	6	43	27 26
18	9.63 079	27	9.67 458	32	0.32 542	9.95 621	6	42	1 2.7 2.6
19	9.63 106	27	9.67 491	33	0.32 509	9.95 615	6	41	2 5.4 5.2
20	9.63 133	26	9.67 524	32	0.32 476	9.95 609	6	40	3 8.1 7.8
21	9.63 159	27	9.67 556	33	0.32 444	9.95 603	6	39	4 10.8 10.4
22	9.63 186	27	9.67 589	33	0.32 411	9.95 597	6	38	5 13.5 13.0
23	9.63 213	26	9.67 622	32	0.32 378	9.95 591	6	37	6 16.2 15.6
24	9.63 239	27	9.67 654	33	0.32 346	9.95 585	6	36	7 18.9 18.2
25	9.63 266	27	9.67 687	33	0.32 313	9.95 579	6	35	8 21.6 20.8
26	9.63 292	26	9.67 719	32	0.32 281	9.95 573	6	34	9 24.3 23.4
27	9.63 319	27	9.67 752	33	0.32 248	9.95 567	6	33	
28	9.63 345	27	9.67 785	33	0.32 215	9.95 561	6	32	
29	9.63 372	26	9.67 817	32	0.32 183	9.95 555	6	31	
30	9.63 398	27	9.67 850	33	0.32 150	9.95 549	6	30	7 6 5
31	9.63 425	27	9.67 882	32	0.32 118	9.95 543	6	29	1 0.7 0.6 0.5
32	9.63 451	26	9.67 915	33	0.32 085	9.95 537	6	28	2 1.4 1.2 1.0
33	9.63 478	26	9.67 947	32	0.32 053	9.95 531	6	27	3 2.1 1.8 1.5
34	9.63 504	27	9.67 980	33	0.32 020	9.95 525	6	26	4 2.8 2.4 2.0
35	9.63 531	27	9.68 012	32	0.31 988	9.95 519	6	25	5 3.5 3.0 2.5
36	9.63 557	26	9.68 044	33	0.31 956	9.95 513	6	24	6 4.2 3.6 3.0
37	9.63 583	27	9.68 077	33	0.31 923	9.95 507	7	23	7 4.9 4.2 3.5
38	9.63 610	26	9.68 109	32	0.31 891	9.95 500	6	22	8 5.6 4.8 4.0
39	9.63 636	26	9.68 142	33	0.31 858	9.95 494	6	21	9 6.3 5.4 4.5
40	9.63 662	27	9.68 174	32	0.31 826	9.95 488	6	20	
41	9.63 689	26	9.68 206	33	0.31 794	9.95 482	6	19	
42	9.63 715	26	9.68 239	32	0.31 761	9.95 476	6	18	
43	9.63 741	26	9.68 271	32	0.31 729	9.95 470	6	17	
44	9.63 767	27	9.68 303	33	0.31 697	9.95 464	6	16	
45	9.63 794	26	9.68 336	32	0.31 664	9.95 458	6	15	
46	9.63 820	26	9.68 368	32	0.31 632	9.95 452	6	14	
47	9.63 846	26	9.68 400	32	0.31 600	9.95 446	6	13	7 6 5
48	9.63 872	26	9.68 432	32	0.31 568	9.95 440	6	12	7 32 32 33
49	9.63 898	26	9.68 465	33	0.31 535	9.95 434	7	11	0 2.3 2.7 3.3
50	9.63 924	26	9.68 497	32	0.31 503	9.95 427	6	10	1 6.9 8.0 9.9
51	9.63 950	26	9.68 529	32	0.31 471	9.95 421	6	9	2 11.4 13.3 16.5
52	9.63 976	26	9.68 561	32	0.31 439	9.95 415	6	8	3 16.0 18.7 23.1
53	9.64 002	26	9.68 593	32	0.31 407	9.95 409	6	7	4 20.6 24.0 29.7
54	9.64 028	26	9.68 626	33	0.31 374	9.95 403	6	6	5 25.1 29.3 —
55	9.64 054	26	9.68 658	32	0.31 342	9.95 397	6	5	6 29.7 — —
56	9.64 080	26	9.68 690	32	0.31 310	9.95 391	7	4	
57	9.64 106	26	9.68 722	32	0.31 278	9.95 384	6	3	
58	9.64 132	26	9.68 754	32	0.31 246	9.95 378	6	2	
59	9.64 158	26	9.68 786	32	0.31 214	9.95 372	6	1	
60	9.64 184		9.68 818	32	0.31 182	9.95 366	6	0	
	L. Cos.	d.	L. Cot.	c. d.	L. Tan.	L. Sin.	d.	'	P. P.

'	L. Sin.	d.	L. Tan.	c. d.	L. Cot.	L. Cos.	d.		P. P.
0	9.64 184	26	9.68 818	32	0.31 182	9.95 366	6	60	
1	9.64 210	26	9.68 850	32	0.31 150	9.95 360	6	59	
2	9.64 236	26	9.68 882	32	0.31 118	9.95 354	6	58	
3	9.64 262	26	9.68 914	32	0.31 086	9.95 348	6	57	
4	9.64 288	26	9.68 946	32	0.31 054	9.95 341	7	56	32 31
5	9.64 313	25	9.68 978	32	0.31 022	9.95 335	6	55	1 3.2 3.1
6	9.64 339	26	9.69 010	32	0.30 990	9.95 329	6	54	2 6.4 6.2
7	9.64 365	26	9.69 042	32	0.30 958	9.95 323	6	53	3 9.6 9.3
8	9.64 391	26	9.69 074	32	0.30 926	9.95 317	6	52	4 12.8 12.4
9	9.64 417	26	9.69 106	32	0.30 894	9.95 310	7	51	5 16.0 15.5
10	9.64 442	25	9.69 138	32	0.30 862	9.95 304	6	50	6 19.2 18.6
11	9.64 468	26	9.69 170	32	0.30 830	9.95 298	6	49	7 22.4 21.7
12	9.64 494	26	9.69 202	32	0.30 798	9.95 292	6	48	8 25.6 24.8
13	9.64 519	25	9.69 234	32	0.30 766	9.95 286	6	47	9 28.8 27.9
14	9.64 545	26	9.69 266	32	0.30 734	9.95 279	7	46	
15	9.64 571	26	9.69 298	32	0.30 702	9.95 273	6	45	
16	9.64 596	25	9.69 329	31	0.30 671	9.95 267	6	44	
17	9.64 622	26	9.69 361	32	0.30 639	9.95 261	6	43	26 25 24
18	9.64 647	25	9.69 393	32	0.30 607	9.95 254	7	42	1 2.6 2.5 2.4
19	9.64 673	26	9.69 425	32	0.30 575	9.95 248	6	41	2 5.2 5.0 4.8
20	9.64 698	25	9.69 457	32	0.30 543	9.95 242	6	40	3 7.8 7.5 7.2
21	9.64 724	26	9.69 488	31	0.30 512	9.95 236	6	39	4 10.4 10.0 9.6
22	9.64 749	25	9.69 520	32	0.30 480	9.95 229	7	38	5 13.0 12.5 12.0
23	9.64 775	26	9.69 552	32	0.30 448	9.95 223	6	37	6 15.6 15.0 14.4
24	9.64 800	25	9.69 584	32	0.30 416	9.95 217	6	36	7 18.2 17.5 16.8
25	9.64 826	26	9.69 615	31	0.30 385	9.95 211	6	35	8 20.8 20.0 19.2
26	9.64 851	25	9.69 647	32	0.30 353	9.95 204	7	34	9 23.4 22.5 21.6
27	9.64 877	26	9.69 679	32	0.30 321	9.95 198	6	33	
28	9.64 902	25	9.69 710	31	0.30 290	9.95 192	6	32	
29	9.64 927	26	9.69 742	32	0.30 258	9.95 185	7	31	
30	9.64 953	25	9.69 774	32	0.30 226	9.95 179	6	30	7 6
31	9.64 978	26	9.69 805	31	0.30 195	9.95 173	6	29	1 0.7 0.6
32	9.65 003	25	9.69 837	32	0.30 163	9.95 167	6	28	2 1.4 1.2
33	9.65 029	26	9.69 868	31	0.30 132	9.95 160	7	27	3 2.1 1.8
34	9.65 054	25	9.69 900	32	0.30 100	9.95 154	6	26	4 2.8 2.4
35	9.65 079	26	9.69 932	32	0.30 068	9.95 148	6	25	5 3.5 3.0
36	9.65 104	25	9.69 963	31	0.30 037	9.95 141	7	24	6 4.2 3.6
37	9.65 130	26	9.69 995	32	0.30 005	9.95 135	6	23	7 4.9 4.2
38	9.65 155	25	9.70 026	31	0.29 974	9.95 129	6	22	8 5.6 4.8
39	9.65 180	26	9.70 058	32	0.29 942	9.95 122	7	21	9 6.3 5.4
40	9.65 205	25	9.70 089	31	0.29 911	9.95 116	6	20	
41	9.65 230	26	9.70 121	32	0.29 879	9.95 110	6	19	
42	9.65 255	25	9.70 152	31	0.29 848	9.95 103	7	18	
43	9.65 281	26	9.70 184	32	0.29 816	9.95 097	6	17	
44	9.65 306	25	9.70 215	31	0.29 785	9.95 090	7	16	
45	9.65 331	26	9.70 247	32	0.29 753	9.95 084	6	15	
46	9.65 356	25	9.70.278	31	0.29 722	9.95 078	6	14	
47	9.65 381	26	9.70 309	32	0.29 691	9.95 071	7	13	
48	9.65 406	25	9.70 341	31	0.29 659	9.95 065	6	12	7 7 6
49	9.65 431	26	9.70 372	32	0.29 628	9.95 059	6	11	32 31 32
50	9.65 456	25	9.70 404	32	0.29 596	9.95 052	7	10	0 2.3 2.2 2.7
51	9.65 481	26	9.70 435	31	0.29 565	9.95 046	6	9	1 6.9 6.6 8.0
52	9.65 506	25	9.70 466	32	0.29 534	9.95 039	7	8	2 11.4 11.1 13.3
53	9.65 531	26	9.70 498	32	0.29 502	9.95 033	6	7	3 16.0 15.5 18.7
54	9.65 556	25	9.70 529	31	0.29 471	9.95 027	6	6	4 20.6 19.9 24.0
55	9.65 580	24	9.70 560	32	0.29 440	9.95 020	7	5	5 25.1 24.4 29.3
56	9.65 605	25	9.70 592	32	0.29 408	9.95 014	6	4	6 29.7 28.8 —
57	9.65 630	26	9.70 623	31	0.29 377	9.95 007	7	3	
58	9.65 655	25	9.70 654	32	0.29 346	9.95 001	6	2	
59	9.65 680	25	9.70 685	31	0.29 315	9.94 995	6	1	
60	9.65 705	25	9.70 717	32	0.29 283	9.94 988	7	0	
	L. Cos.	d.	L. Cot.	c. d.	L. Tan.	L. Sin.	d.	'	P. P.

	L. Sin.	d.	L. Tan.	c. d.	L. Cot.	L. Cos.	d.		P. P.
0	9.65 703	24	9.70 717	31	0.29 283	9.94 988	6	60	
1	9.65 729	25	9.70 748	31	0.29 252	9.94 982	7	59	
2	9.65 754	25	9.70 779	31	0.29 221	9.94 975	7	58	
3	9.65 779	25	9.70 810	31	0.29 190	9.94 969	6	57	
4	9.65 804	24	9.70 841	31	0.29 159	9.94 962	7	56	32 31 30
5	9.65 828	25	9.70 873	31	0.29 127	9.94 956	7	55	1 3.2 3.1 3.0
6	9.65 853	25	9.70 904	31	0.29 096	9.94 949	7	54	2 6.4 6.2 6.0
7	9.65 878	25	9.70 935	31	0.29 065	9.94 943	6	53	3 9.6 9.3 9.0
8	9.65 902	24	9.70 966	31	0.29 034	9.94 936	7	52	4 12.8 12.4 12.0
9	9.65 927	25	9.70 997	31	0.29 003	9.94 930	6	51	5 16.0 15.5 15.0
10	9.65 952	24	9.71 028	31	0.28 972	9.94 923	7	50	6 19.2 18.6 18.0
11	9.65 976	25	9.71 059	31	0.28 941	9.94 917	6	49	7 22.4 21.7 21.0
12	9.66 001	24	9.71 090	31	0.28 910	9.94 911	7	48	8 25.6 24.8 24.0
13	9.66 025	25	9.71 121	31	0.28 879	9.94 904	6	47	9 28.8 27.9 27.0
14	9.66 050	25	9.71 153	32	0.28 847	9.94 898	7	46	
15	9.66 075	24	9.71 184	31	0.28 816	9.94 891	6	45	
16	9.66 099	25	9.71 215	31	0.28 785	9.94 885	7	44	
17	9.66 124	24	9.71 246	31	0.28 754	9.94 878	6	43	25 24 23
18	9.66 148	25	9.71 277	31	0.28 723	9.94 871	7	42	1 2.5 2.4 2.3
19	9.66 173	24	9.71 308	31	0.28 692	9.94 865	6	41	2 5.0 4.8 4.6
20	9.66 197	25	9.71 339	31	0.28 661	9.94 858	7	40	3 7.5 7.2 6.9
21	9.66 221	24	9.71 370	31	0.28 630	9.94 852	6	39	4 10.0 9.6 9.2
22	9.66 246	25	9.71 401	31	0.28 599	9.94 845	7	38	5 12.5 12.0 11.5
23	9.66 270	24	9.71 431	30	0.28 569	9.94 839	6	37	6 15.0 14.4 13.8
24	9.66 295	25	9.71 462	31	0.28 538	9.94 832	7	36	7 17.5 16.8 16.1
25	9.66 319	24	9.71 493	31	0.28 507	9.94 826	6	35	8 20.0 19.2 18.4
26	9.66 343	25	9.71 524	31	0.28 476	9.94 819	7	34	9 22.5 21.6 20.7
27	9.66 368	24	9.71 555	31	0.28 445	9.94 813	6	33	
28	9.66 392	25	9.71 586	31	0.28 414	9.94 806	7	32	
29	9.66 416	24	9.71 617	31	0.28 383	9.94 799	6	31	
30	9.66 441	25	9.71 648	31	0.28 352	9.94 793	7	30	7 6
31	9.66 465	24	9.71 679	31	0.28 321	9.94 786	6	29	1 0.7 0.6
32	9.66 489	25	9.71 709	30	0.28 291	9.94 780	7	28	2 1.4 1.2
33	9.66 513	24	9.71 740	31	0.28 260	9.94 773	6	27	3 2.1 1.8
34	9.66 537	25	9.71 771	31	0.28 229	9.94 767	7	26	4 2.8 2.4
35	9.66 562	24	9.71 802	31	0.28 198	9.94 760	6	25	5 3.5 3.0
36	9.66 586	25	9.71 833	31	0.28 167	9.94 753	7	24	6 4.2 3.6
37	9.66 610	24	9.71 863	30	0.28 137	9.94 747	6	23	7 4.9 4.2
38	9.66 634	25	9.71 894	31	0.28 106	9.94 740	7	22	8 5.6 4.8
39	9.66 658	24	9.71 925	31	0.28 075	9.94 734	6	21	9 6.3 5.4
40	9.66 682	25	9.71 955	30	0.28 045	9.94 727	7	20	
41	9.66 706	24	9.71 986	31	0.28 014	9.94 720	6	19	
42	9.66 731	25	9.72 017	31	0.27 983	9.94 714	7	18	
43	9.66 755	24	9.72 048	31	0.27 952	9.94 707	6	17	
44	9.66 779	25	9.72 078	30	0.27 922	9.94 700	7	16	
45	9.66 803	24	9.72 109	31	0.27 891	9.94 694	6	15	
46	9.66 827	25	9.72 140	31	0.27 860	9.94 687	7	14	
47	9.66 851	24	9.72 170	30	0.27 830	9.94 680	6	13	
48	9.66 875	25	9.72 201	31	0.27 799	9.94 674	7	12	7 6 6
49	9.66 899	24	9.72 231	30	0.27 769	9.94 667	6	11	30 31 30
50	9.66 922	25	9.72 262	31	0.27 738	9.94 660	7	10	0 2.1 2.6 2.5
51	9.66 946	24	9.72 293	31	0.27 707	9.94 654	6	9	1 6.4 7.8 7.5
52	9.66 970	25	9.72 323	30	0.27 677	9.94 647	7	8	2 10.7 12.9 12.5
53	9.66 994	24	9.72 354	31	0.27 646	9.94 640	6	7	3 15.0 18.1 17.5
54	9.67 018	25	9.72 384	30	0.27 616	9.94 634	7	6	4 19.3 23.2 22.5
55	9.67 042	24	9.72 415	31	0.27 585	9.94 627	6	5	5 23.6 28.4 27.5
56	9.67 066	25	9.72 445	30	0.27 555	9.94 620	7	4	6 27.9 — —
57	9.67 090	24	9.72 476	31	0.27 524	9.94 614	6	3	
58	9.67 113	25	9.72 506	30	0.27 494	9.94 607	7	2	
59	9.67 137	24	9.72 537	31	0.27 463	9.94 600	6	1	
60	9.67 161	25	9.72 567	30	0.27 433	9.94 593	7	0	
	L. Cos.	d.	L. Cot.	c. d.	L. Tan.	L. Sin.	d.		P. P.



'	L. Sin.	d.	L. Tan.	c. d.	L. Cot.	L. Cos.	d.		P. P.
0	9.67 161	24	9.72 567	31	0.27 433	9.94 593	6	60	
1	9.67 185	23	9.72 598	30	0.27 402	9.94 587	7	59	
2	9.67 208	24	9.72 628	31	0.27 372	9.94 580	7	58	
3	9.67 232	24	9.72 659	30	0.27 341	9.94 573	7	57	
4	9.67 256	24	9.72 689	30	0.27 311	9.94 567	6	56	31 30 29
5	9.67 280	23	9.72 720	31	0.27 280	9.94 560	7	55	1 3.1 3.0 2.9
6	9.67 303	24	9.72 750	30	0.27 250	9.94 553	7	54	2 6.2 6.0 5.8
7	9.67 327	23	9.72 780	31	0.27 220	9.94 546	7	53	3 9.3 9.0 8.7
8	9.67 350	24	9.72 811	30	0.27 189	9.94 540	6	52	4 12.4 12.0 11.6
9	9.67 374	24	9.72 841	31	0.27 159	9.94 533	7	51	5 15.5 15.0 14.5
10	9.67 398	23	9.72 872	30	0.27 128	9.94 526	7	50	6 18.6 18.0 17.4
11	9.67 421	24	9.72 902	30	0.27 098	9.94 519	6	49	7 21.7 21.0 20.3
12	9.67 445	23	9.72 932	31	0.27 068	9.94 513	7	48	8 24.8 24.0 23.2
13	9.67 468	24	9.72 963	30	0.27 037	9.94 506	7	47	9 27.9 27.0 26.1
14	9.67 492	23	9.72 993	30	0.27 007	9.94 499	7	46	
15	9.67 515	24	9.73 023	31	0.26 977	9.94 492	7	45	
16	9.67 539	23	9.73 054	30	0.26 946	9.94 485	6	44	
17	9.67 562	24	9.73 084	30	0.26 916	9.94 479	7	43	24 23 22
18	9.67 586	23	9.73 114	30	0.26 886	9.94 472	7	42	1 2.4 2.3 2.2
19	9.67 609	24	9.73 144	31	0.26 856	9.94 465	7	41	2 4.8 4.6 4.4
20	9.67 633	23	9.73 175	30	0.26 825	9.94 458	7	40	3 7.2 6.9 6.6
21	9.67 656	24	9.73 205	30	0.26 795	9.94 451	6	39	4 9.6 9.2 8.8
22	9.67 680	23	9.73 235	30	0.26 765	9.94 445	7	38	5 12.0 11.5 11.0
23	9.67 703	24	9.73 265	30	0.26 735	9.94 438	7	37	6 14.4 13.8 13.2
24	9.67 726	23	9.73 295	31	0.26 705	9.94 431	7	36	7 16.8 16.1 15.4
25	9.67 750	23	9.73 326	30	0.26 674	9.94 424	7	35	8 19.2 18.4 17.6
26	9.67 773	23	9.73 356	30	0.26 644	9.94 417	7	34	9 21.6 20.7 19.8
27	9.67 796	24	9.73 386	30	0.26 614	9.94 410	6	33	
28	9.67 820	23	9.73 416	30	0.26 584	9.94 404	7	32	
29	9.67 843	23	9.73 446	30	0.26 554	9.94 397	7	31	
30	9.67 866	24	9.73 476	31	0.26 524	9.94 390	7	30	7 6
31	9.67 890	23	9.73 507	30	0.26 493	9.94 383	7	29	1 0.7 0.6
32	9.67 913	23	9.73 537	30	0.26 463	9.94 376	7	28	2 1.4 1.2
33	9.67 936	23	9.73 567	30	0.26 433	9.94 369	7	27	3 2.1 1.8
34	9.67 959	23	9.73 597	30	0.26 403	9.94 362	7	26	4 2.8 2.4
35	9.67 982	24	9.73 627	30	0.26 373	9.94 355	6	25	5 3.5 3.0
36	9.68 006	23	9.73 657	30	0.26 343	9.94 349	7	24	6 4.2 3.6
37	9.68 029	23	9.73 687	30	0.26 313	9.94 342	7	23	7 4.9 4.2
38	9.68 052	23	9.73 717	30	0.26 283	9.94 335	7	22	8 5.6 4.8
39	9.68 075	23	9.73 747	30	0.26 253	9.94 328	7	21	9 6.3 5.4
40	9.68 098	23	9.73 777	30	0.26 223	9.94 321	7	20	
41	9.68 121	23	9.73 807	30	0.26 193	9.94 314	7	19	
42	9.68 144	23	9.73 837	30	0.26 163	9.94 307	7	18	
43	9.68 167	23	9.73 867	30	0.26 133	9.94 300	7	17	
44	9.68 190	23	9.73 897	30	0.26 103	9.94 293	7	16	
45	9.68 213	23	9.73 927	30	0.26 073	9.94 286	7	15	
46	9.68 237	24	9.73 957	30	0.26 043	9.94 279	6	14	
47	9.68 260	23	9.73 987	30	0.26 013	9.94 273	7	13	
48	9.68 283	22	9.74 017	30	0.25 983	9.94 266	7	12	7 6 6
49	9.68 305	23	9.74 047	30	0.25 953	9.94 259	7	11	31 31 30
50	9.68 328	23	9.74 077	30	0.25 923	9.94 252	7	10	0 2.2 2.6 2.5
51	9.68 351	23	9.74 107	30	0.25 893	9.94 245	7	9	1 6.6 7.8 7.5
52	9.68 374	23	9.74 137	29	0.25 863	9.94 238	7	8	2 11.1 12.9 12.5
53	9.68 397	23	9.74 166	30	0.25 834	9.94 231	7	7	3 15.5 18.1 17.5
54	9.68 420	23	9.74 196	30	0.25 804	9.94 224	7	6	4 19.9 23.2 22.5
55	9.68 443	23	9.74 226	30	0.25 774	9.94 217	7	5	5 24.4 28.4 27.5
56	9.68 466	23	9.74 256	30	0.25 744	9.94 210	7	4	6 28.8 — —
57	9.68 489	23	9.74 286	30	0.25 714	9.94 203	7	3	
58	9.68 512	22	9.74 316	29	0.25 684	9.94 196	7	2	
59	9.68 534	23	9.74 345	30	0.25 655	9.94 189	7	1	
60	9.68 557	23	9.74 375	30	0.25 625	9.94 182	7	0	
	L. Cos.	d.	L. Cot.	c. d.	L. Tan.	L. Sin.	d.	'	P. P.

'	L. Sin.	d.	L. Tan.	c. d.	L. Cot.	L. Cos.	d.		P. P.
0	9.68 557	23	9.74 375	30	0.25 625	9.94 182	7	60	
1	9.68 580	23	9.74 405	30	0.25 595	9.94 175	7	59	
2	9.68 603	22	9.74 435	30	0.25 565	9.94 168	7	58	
3	9.68 625	23	9.74 465	29	0.25 535	9.94 161	7	57	
4	9.68 648	23	9.74 494	30	0.25 506	9.94 154	7	56	
5	9.68 671	23	9.74 524	30	0.25 476	9.94 147	7	55	
6	9.68 694	22	9.74 554	29	0.25 446	9.94 140	7	54	
7	9.68 716	23	9.74 583	30	0.25 417	9.94 133	7	53	
8	9.68 739	23	9.74 613	30	0.25 387	9.94 126	7	52	
9	9.68 762	22	9.74 643	30	0.25 357	9.94 119	7	51	
10	9.68 784	23	9.74 673	29	0.25 327	9.94 112	7	50	
11	9.68 807	22	9.74 702	30	0.25 298	9.94 105	7	49	
12	9.68 829	23	9.74 732	30	0.25 268	9.94 098	7	48	
13	9.68 852	23	9.74 762	29	0.25 238	9.94 090	7	47	
14	9.68 875	22	9.74 791	30	0.25 209	9.94 083	7	46	
15	9.68 897	23	9.74 821	30	0.25 179	9.94 076	7	45	
16	9.68 920	22	9.74 851	29	0.25 149	9.94 069	7	44	
17	9.68 942	23	9.74 880	30	0.25 120	9.94 062	7	43	
18	9.68 965	22	9.74 910	29	0.25 090	9.94 055	7	42	
19	9.68 987	23	9.74 939	30	0.25 061	9.94 048	7	41	
20	9.69 010	22	9.74 969	29	0.25 031	9.94 041	7	40	
21	9.69 032	23	9.74 998	30	0.25 002	9.94 034	7	39	
22	9.69 055	22	9.75 028	30	0.24 972	9.94 027	7	38	
23	9.69 077	23	9.75 058	29	0.24 942	9.94 020	7	37	
24	9.69 100	22	9.75 087	30	0.24 913	9.94 012	7	36	
25	9.69 122	22	9.75 117	29	0.24 883	9.94 005	7	35	
26	9.69 144	23	9.75 146	30	0.24 854	9.93 998	7	34	
27	9.69 167	22	9.75 176	29	0.24 824	9.93 991	7	33	
28	9.69 189	23	9.75 205	30	0.24 795	9.93 984	7	32	
29	9.69 212	22	9.75 235	29	0.24 765	9.93 977	7	31	
30	9.69 234	22	9.75 264	30	0.24 736	9.93 970	7	30	
31	9.69 256	23	9.75 294	29	0.24 706	9.93 963	7	29	
32	9.69 279	22	9.75 323	30	0.24 677	9.93 955	7	28	
33	9.69 301	22	9.75 353	29	0.24 647	9.93 948	7	27	
34	9.69 323	22	9.75 382	29	0.24 618	9.93 941	7	26	
35	9.69 345	23	9.75 411	30	0.24 589	9.93 934	7	25	
36	9.69 368	22	9.75 441	29	0.24 559	9.93 927	7	24	
37	9.69 390	22	9.75 470	30	0.24 530	9.93 920	7	23	
38	9.69 412	22	9.75 500	29	0.24 500	9.93 912	7	22	
39	9.69 434	22	9.75 529	29	0.24 471	9.93 905	7	21	
40	9.69 456	23	9.75 558	30	0.24 442	9.93 898	7	20	
41	9.69 479	22	9.75 588	29	0.24 412	9.93 891	7	19	
42	9.69 501	22	9.75 617	30	0.24 383	9.93 884	7	18	
43	9.69 523	22	9.75 647	29	0.24 353	9.93 876	7	17	
44	9.69 545	22	9.75 676	29	0.24 324	9.93 869	7	16	
45	9.69 567	22	9.75 705	30	0.24 295	9.93 862	7	15	
46	9.69 589	22	9.75 735	29	0.24 265	9.93 855	7	14	
47	9.69 611	22	9.75 764	29	0.24 236	9.93 847	7	13	
48	9.69 633	22	9.75 793	29	0.24 207	9.93 840	7	12	
49	9.69 655	22	9.75 822	30	0.24 178	9.93 833	7	11	
50	9.69 677	22	9.75 852	29	0.24 148	9.93 826	7	10	
51	9.69 699	22	9.75 881	29	0.24 119	9.93 819	7	9	
52	9.69 721	22	9.75 910	29	0.24 090	9.93 811	7	8	
53	9.69 743	22	9.75 939	30	0.24 061	9.93 804	7	7	
54	9.69 765	22	9.75 969	29	0.24 031	9.93 797	7	6	
55	9.69 787	22	9.75 998	29	0.24 002	9.93 789	7	5	
56	9.69 809	22	9.76 027	29	0.23 973	9.93 782	7	4	
57	9.69 831	22	9.76 056	30	0.23 944	9.93 775	7	3	
58	9.69 853	22	9.76 086	29	0.23 914	9.93 768	7	2	
59	9.69 875	22	9.76 115	29	0.23 885	9.93 760	7	1	
60	9.69 897		9.76 144		0.23 856	9.93 753	7	0	
	L. Cos.	d.	L. Cot.	c. d.	L. Tan.	L. Sin.	d.	'	P. P.

'	L. Sin.	d.	L. Tan.	c. d.	L. Cot.	L. Cos.	d.		P. P.
0	9.69 897	22	9.76 144	29	0.23 856	9.93 753	7	60	
1	9.69 919	22	9.76 173	29	0.23 827	9.93 746	8	59	
2	9.69 941	22	9.76 202	29	0.23 798	9.93 738	7	58	
3	9.69 963	21	9.76 231	30	0.23 769	9.93 731	7	57	
4	9.69 984	22	9.76 261	29	0.23 739	9.93 724	7	56	30 29 28
5	9.70 006	22	9.76 290	29	0.23 710	9.93 717	7	55	1 3.0 2.9 2.8
6	9.70 028	22	9.76 319	29	0.23 681	9.93 709	8	54	2 6.0 5.8 5.6
7	9.70 050	22	9.76 348	29	0.23 652	9.93 702	7	53	3 9.0 8.7 8.4
8	9.70 072	21	9.76 377	29	0.23 623	9.93 695	7	52	4 12.0 11.6 11.2
9	9.70 093	22	9.76 406	29	0.23 594	9.93 687	8	51	5 15.0 14.5 14.0
10	9.70 115	22	9.76 435	29	0.23 565	9.93 680	7	50	6 18.0 17.4 16.8
11	9.70 137	22	9.76 464	29	0.23 536	9.93 673	8	49	7 21.0 20.3 19.6
12	9.70 159	21	9.76 493	29	0.23 507	9.93 665	7	48	8 24.0 23.2 22.4
13	9.70 180	22	9.76 522	29	0.23 478	9.93 658	8	47	9 27.0 26.1 25.2
14	9.70 202	22	9.76 551	29	0.23 449	9.93 650	7	46	
15	9.70 224	21	9.76 580	29	0.23 420	9.93 643	7	45	
16	9.70 245	22	9.76 609	30	0.23 391	9.93 636	8	44	
17	9.70 267	21	9.76 639	29	0.23 361	9.93 628	7	43	22 21
18	9.70 288	22	9.76 668	29	0.23 332	9.93 621	7	42	1 2.2 2.1
19	9.70 310	22	9.76 697	28	0.23 303	9.93 614	8	41	2 4.4 4.2
20	9.70 332	21	9.76 725	29	0.23 275	9.93 606	7	40	3 6.6 6.3
21	9.70 353	22	9.76 754	29	0.23 246	9.93 599	8	39	4 8.8 8.4
22	9.70 375	21	9.76 783	29	0.23 217	9.93 591	7	38	5 11.0 10.5
23	9.70 396	22	9.76 812	29	0.23 188	9.93 584	7	37	6 13.2 12.6
24	9.70 418	21	9.76 841	29	0.23 159	9.93 577	7	36	7 15.4 14.7
25	9.70 439	22	9.76 870	29	0.23 130	9.93 569	8	35	8 17.6 16.8
26	9.70 461	21	9.76 899	29	0.23 101	9.93 562	7	34	9 19.8 18.9
27	9.70 482	22	9.76 928	29	0.23 072	9.93 554	8	33	
28	9.70 504	21	9.76 957	29	0.23 043	9.93 547	7	32	
29	9.70 525	22	9.76 986	29	0.23 014	9.93 539	8	31	
30	9.70 547	21	9.77 015	29	0.22 985	9.93 532	7	30	8 7
31	9.70 568	22	9.77 044	29	0.22 956	9.93 525	8	29	1 0.8 0.7
32	9.70 590	21	9.77 073	28	0.22 927	9.93 517	7	28	2 1.6 1.4
33	9.70 611	22	9.77 101	29	0.22 899	9.93 510	8	27	3 2.4 2.1
34	9.70 633	21	9.77 130	29	0.22 870	9.93 502	7	26	4 3.2 2.8
35	9.70 654	21	9.77 159	29	0.22 841	9.93 495	8	25	5 4.0 3.5
36	9.70 675	22	9.77 188	29	0.22 812	9.93 487	7	24	6 4.8 4.2
37	9.70 697	21	9.77 217	29	0.22 783	9.93 480	8	23	7 5.6 4.9
38	9.70 718	21	9.77 246	28	0.22 754	9.93 472	7	22	8 6.4 5.6
39	9.70 739	22	9.77 274	29	0.22 726	9.93 465	8	21	9 7.2 6.3
40	9.70 761	21	9.77 303	29	0.22 697	9.93 457	7	20	
41	9.70 782	21	9.77 332	29	0.22 668	9.93 450	8	19	
42	9.70 803	21	9.77 361	29	0.22 639	9.93 442	7	18	
43	9.70 824	22	9.77 390	28	0.22 610	9.93 435	8	17	
44	9.70 846	21	9.77 418	29	0.22 582	9.93 427	7	16	
45	9.70 867	21	9.77 447	29	0.22 553	9.93 420	8	15	
46	9.70 888	21	9.77 476	29	0.22 524	9.93 412	7	14	
47	9.70 909	22	9.77 505	28	0.22 495	9.93 405	8	13	
48	9.70 931	21	9.77 533	29	0.22 467	9.93 397	7	12	7 7 7
49	9.70 952	21	9.77 562	29	0.22 438	9.93 390	8	11	30 29 28
50	9.70 973	21	9.77 591	28	0.22 409	9.93 382	7	10	0 2.1 2.1 2.0
51	9.70 994	21	9.77 619	29	0.22 381	9.93 375	8	9	1 6.4 6.2 6.0
52	9.71 015	21	9.77 648	29	0.22 352	9.93 367	7	8	2 10.7 10.4 10.0
53	9.71 036	22	9.77 677	29	0.22 323	9.93 360	8	7	3 15.0 14.5 14.0
54	9.71 058	21	9.77 706	28	0.22 294	9.93 352	7	6	4 19.3 18.6 18.0
55	9.71 079	21	9.77 734	29	0.22 266	9.93 344	8	5	5 23.6 22.8 22.0
56	9.71 100	21	9.77 763	28	0.22 237	9.93 337	7	4	6 27.9 26.9 26.0
57	9.71 121	21	9.77 791	29	0.22 209	9.93 329	8	3	7
58	9.71 142	21	9.77 820	29	0.22 180	9.93 322	7	2	
59	9.71 163	21	9.77 849	28	0.22 151	9.93 314	8	1	
60	9.71 184	21	9.77 877	28	0.22 123	9.93 307	7	0	
	L. Cos.	d.	L. Cot.	c. d.	L. Tan.	L. Sin.	d.	'	P. P.



'	L. Sin.	d.	L. Tan.	c. d.	L. Cot.	L. Cos.	d.		P. P.
0	9.71 184	21	9.77 877	29	0.22 123	9.93 307	8	60	
1	9.71 205	21	9.77 906	29	0.22 094	9.93 299	8	59	
2	9.71 226	21	9.77 935	28	0.22 065	9.93 291	7	58	
3	9.71 247	21	9.77 963	29	0.22 037	9.93 284	8	57	
4	9.71 268	21	9.77 992	28	0.22 008	9.93 276	7	56	29 28
5	9.71 289	21	9.78 020	29	0.21 980	9.93 269	8	55	1 2.9 2.8
6	9.71 310	21	9.78 049	28	0.21 951	9.93 261	8	54	2 5.8 5.6
7	9.71 331	21	9.78 077	29	0.21 923	9.93 253	7	53	3 8.7 8.4
8	9.71 352	21	9.78 106	29	0.21 894	9.93 246	7	52	4 11.6 11.2
9	9.71 373	20	9.78 135	28	0.21 865	9.93 238	8	51	5 14.5 14.0
10	9.71 393	21	9.78 163	29	0.21 837	9.93 230	7	50	6 17.4 16.8
11	9.71 414	21	9.78 192	28	0.21 808	9.93 223	8	49	7 20.3 19.6
12	9.71 435	21	9.78 220	29	0.21 780	9.93 215	8	48	8 23.2 22.4
13	9.71 456	21	9.78 249	28	0.21 751	9.93 207	7	47	9 26.1 25.2
14	9.71 477	21	9.78 277	29	0.21 723	9.93 200	8	46	
15	9.71 498	21	9.78 306	28	0.21 694	9.93 192	8	45	
16	9.71 519	20	9.78 334	29	0.21 666	9.93 184	7	44	21 20
17	9.71 539	21	9.78 363	28	0.21 637	9.93 177	8	43	
18	9.71 560	21	9.78 391	28	0.21 609	9.93 169	8	42	1 2.1 2.0
19	9.71 581	21	9.78 419	29	0.21 581	9.93 161	7	41	2 4.2 4.0
20	9.71 602	20	9.78 448	28	0.21 552	9.93 154	8	40	3 6.3 6.0
21	9.71 622	21	9.78 476	29	0.21 524	9.93 146	8	39	4 8.4 8.0
22	9.71 643	21	9.78 505	28	0.21 495	9.93 138	7	38	5 10.5 10.0
23	9.71 664	21	9.78 533	29	0.21 467	9.93 131	8	37	6 12.6 12.0
24	9.71 685	20	9.78 562	28	0.21 438	9.93 123	8	36	7 14.7 14.0
25	9.71 705	21	9.78 590	28	0.21 410	9.93 115	7	35	8 16.8 16.0
26	9.71 726	21	9.78 618	29	0.21 382	9.93 108	8	34	9 18.9 18.0
27	9.71 747	20	9.78 647	28	0.21 353	9.93 100	8	33	
28	9.71 767	21	9.78 675	29	0.21 325	9.93 092	8	32	
29	9.71 788	21	9.78 704	28	0.21 296	9.93 084	7	31	8 7
30	9.71 809	20	9.78 732	28	0.21 268	9.93 077	8	30	
31	9.71 829	21	9.78 760	29	0.21 240	9.93 069	8	29	1 0.8 0.7
32	9.71 850	20	9.78 789	28	0.21 211	9.93 061	8	28	2 1.6 1.4
33	9.71 870	21	9.78 817	28	0.21 183	9.93 053	7	27	3 2.4 2.1
34	9.71 891	20	9.78 845	29	0.21 155	9.93 046	8	26	4 3.2 2.8
35	9.71 911	21	9.78 874	28	0.21 126	9.93 038	8	25	5 4.0 3.5
36	9.71 932	20	9.78 902	28	0.21 098	9.93 030	8	24	6 4.8 4.2
37	9.71 952	21	9.78 930	29	0.21 070	9.93 022	8	23	7 5.6 4.9
38	9.71 973	21	9.78 959	28	0.21 041	9.93 014	7	22	8 6.4 5.6
39	9.71 994	20	9.78 987	28	0.21 013	9.93 007	8	21	9 7.2 6.3
40	9.72 014	20	9.79 015	28	0.20 985	9.92 999	8	20	
41	9.72 034	21	9.79 043	29	0.20 957	9.92 991	8	19	
42	9.72 055	20	9.79 072	28	0.20 928	9.92 983	7	18	
43	9.72 075	21	9.79 100	28	0.20 900	9.92 976	8	17	
44	9.72 096	20	9.79 128	28	0.20 872	9.92 968	8	16	
45	9.72 116	21	9.79 156	29	0.20 844	9.92 960	8	15	
46	9.72 137	20	9.79 185	28	0.20 815	9.92 952	8	14	8 8 8
47	9.72 157	20	9.79 213	28	0.20 787	9.92 944	8	13	30 29 28
48	9.72 177	21	9.79 241	28	0.20 759	9.92 936	7	12	
49	9.72 198	20	9.79 269	28	0.20 731	9.92 929	8	11	
50	9.72 218	20	9.79 297	29	0.20 703	9.92 921	8	10	
51	9.72 238	21	9.79 326	28	0.20 674	9.92 913	8	9	1 1.9 1.8
52	9.72 259	20	9.79 354	28	0.20 646	9.92 905	8	8	2 5.6 5.4
53	9.72 279	20	9.79 382	28	0.20 618	9.92 897	8	7	3 9.4 9.1
54	9.72 299	21	9.79 410	28	0.20 590	9.92 889	8	6	4 13.1 12.7
55	9.72 320	20	9.79 438	28	0.20 562	9.92 881	7	5	5 16.9 16.3
56	9.72 340	20	9.79 466	29	0.20 534	9.92 874	8	4	6 20.6 19.9
57	9.72 360	21	9.79 495	28	0.20 505	9.92 866	8	3	7 24.4 23.6
58	9.72 381	20	9.79 523	28	0.20 477	9.92 858	8	2	8 28.1 27.2
59	9.72 401	20	9.79 551	28	0.20 449	9.92 850	8	1	
60	9.72 421		9.79 579		0.20 421	9.92 842		0	
	L. Cos.	d.	L. Cot.	c. d.	L. Tan.	L. Sin.	d.	'	P. P.

	L. Sin.	d.	L. Tan.	c. d.	L. Cot.	L. Cos.	d.		P. P.
<b>0</b>	9.72 421	20	9.79 579	28	0.20 421	9.92 842	8	<b>60</b>	
1	9.72 441	20	9.79 607	28	0.20 393	9.92 834	8	59	
2	9.72 461	21	9.79 635	28	0.20 365	9.92 826	8	58	
3	9.72 482	20	9.79 663	28	0.20 337	9.92 818	8	57	
4	9.72 502	20	9.79 691	28	0.20 309	9.92 810	7	56	<b>29 28 27</b>
5	9.72 522	20	9.79 719	28	0.20 281	9.92 803	8	55	1 2.9 2.8 2.7
6	9.72 542	20	9.79 747	28	0.20 253	9.92 795	8	54	2 5.8 5.6 5.4
7	9.72 562	20	9.79 776	28	0.20 224	9.92 787	8	53	3 8.7 8.4 8.1
8	9.72 582	20	9.79 804	28	0.20 196	9.92 779	8	52	4 11.6 11.2 10.8
9	9.72 602	20	9.79 832	28	0.20 168	9.92 771	8	51	5 14.5 14.0 13.5
<b>10</b>	9.72 622	21	9.79 860	28	0.20 140	9.92 763	8	<b>50</b>	6 17.4 16.8 16.2
11	9.72 643	20	9.79 888	28	0.20 112	9.92 755	8	49	7 20.3 19.6 18.9
12	9.72 663	20	9.79 916	28	0.20 084	9.92 747	8	48	8 23.2 22.4 21.6
13	9.72 683	20	9.79 944	28	0.20 056	9.92 739	8	47	9 26.1 25.2 24.3
14	9.72 703	20	9.79 972	28	0.20 028	9.92 731	8	46	
15	9.72 723	20	9.80 000	28	0.20 000	9.92 723	8	45	
16	9.72 743	20	9.80 028	28	0.19 972	9.92 715	8	44	<b>21 20 19</b>
17	9.72 763	20	9.80 056	28	0.19 944	9.92 707	8	43	1 2.1 2.0 1.9
18	9.72 783	20	9.80 084	28	0.19 916	9.92 699	8	42	2 4.2 4.0 3.8
19	9.72 803	20	9.80 112	28	0.19 888	9.92 691	8	41	3 6.3 6.0 5.7
<b>20</b>	9.72 823	20	9.80 140	28	0.19 860	9.92 683	8	<b>40</b>	4 8.4 8.0 7.6
21	9.72 843	20	9.80 168	27	0.19 832	9.92 675	8	39	5 10.5 10.0 9.5
22	9.72 863	20	9.80 195	28	0.19 805	9.92 667	8	38	6 12.6 12.0 11.4
23	9.72 883	19	9.80 223	28	0.19 777	9.92 659	8	37	7 14.7 14.0 13.3
24	9.72 902	20	9.80 251	28	0.19 749	9.92 651	8	36	8 16.8 16.0 15.2
25	9.72 922	20	9.80 279	28	0.19 721	9.92 643	8	35	9 18.9 18.0 17.1
26	9.72 942	20	9.80 307	28	0.19 693	9.92 635	8	34	
27	9.72 962	20	9.80 335	28	0.19 665	9.92 627	8	33	
28	9.72 982	20	9.80 363	28	0.19 637	9.92 619	8	32	
29	9.73 002	20	9.80 391	28	0.19 609	9.92 611	8	31	
<b>30</b>	9.73 022	19	9.80 419	28	0.19 581	9.92 603	8	<b>30</b>	<b>9 8 7</b>
31	9.73 041	20	9.80 447	27	0.19 553	9.92 595	8	29	1 0.9 0.8 0.7
32	9.73 061	20	9.80 474	28	0.19 526	9.92 587	8	28	2 1.8 1.6 1.4
33	9.73 081	20	9.80 502	28	0.19 498	9.92 579	8	27	3 2.7 2.4 2.1
34	9.73 101	20	9.80 530	28	0.19 470	9.92 571	8	26	4 3.6 3.2 2.8
35	9.73 121	19	9.80 558	28	0.19 442	9.92 563	8	25	5 4.5 4.0 3.5
36	9.73 140	20	9.80 586	28	0.19 414	9.92 555	9	24	6 5.4 4.8 4.2
37	9.73 160	20	9.80 614	28	0.19 386	9.92 546	8	23	7 6.3 5.6 4.9
38	9.73 180	20	9.80 642	27	0.19 358	9.92 538	8	22	8 7.2 6.4 5.6
39	9.73 200	19	9.80 669	28	0.19 331	9.92 530	8	21	9 8.1 7.2 6.3
<b>40</b>	9.73 219	20	9.80 697	28	0.19 303	9.92 522	8	<b>20</b>	
41	9.73 239	20	9.80 725	28	0.19 275	9.92 514	8	19	
42	9.73 259	19	9.80 753	28	0.19 247	9.92 506	8	18	
43	9.73 278	20	9.80 781	27	0.19 219	9.92 498	8	17	
44	9.73 298	20	9.80 808	28	0.19 192	9.92 490	8	16	
45	9.73 318	19	9.80 836	28	0.19 164	9.92 482	9	15	
46	9.73 337	20	9.80 864	28	0.19 136	9.92 473	8	14	
47	9.73 357	20	9.80 892	27	0.19 108	9.92 465	8	13	<b>8 8 7</b>
48	9.73 377	19	9.80 919	28	0.19 081	9.92 457	8	12	<b>29 28 28</b>
49	9.73 396	20	9.80 947	28	0.19 053	9.92 449	8	11	
<b>50</b>	9.73 416	19	9.80 975	28	0.19 025	9.92 441	8	<b>10</b>	
51	9.73 435	20	9.81 003	27	0.18 997	9.92 433	8	9	0 1.8 1.8 2.0
52	9.73 455	19	9.81 030	28	0.18 970	9.92 425	9	8	1 5.4 5.2 6.0
53	9.73 474	20	9.81 058	28	0.18 942	9.92 416	8	7	2 9.1 8.8 10.0
54	9.73 494	19	9.81 086	27	0.18 914	9.92 408	8	6	3 12.7 12.2 14.0
55	9.73 513	20	9.81 113	28	0.18 887	9.92 400	8	5	4 16.3 15.8 18.0
56	9.73 533	19	9.81 141	28	0.18 859	9.92 392	8	4	5 19.9 19.2 22.0
57	9.73 552	20	9.81 169	27	0.18 831	9.92 384	8	3	6 23.6 22.8 26.0
58	9.73 572	19	9.81 196	28	0.18 804	9.92 376	9	2	7 27.2 26.2 —
59	9.73 591	20	9.81 224	28	0.18 776	9.92 367	8	1	
<b>60</b>	9.73 611	20	9.81 252	28	0.18 748	9.92 359	8	<b>0</b>	
	L. Cos.	d.	L. Cot.	c. d.	L. Tan.	L. Sin.	d.		P. P.

'	L. Sin.	d.	L. Tan.	c. d.	L. Cot.	L. Cos.	d.		P. P.
0	9.73 611	19	9.81 252	27	0.18 748	9.92 359	8	60	
1	9.73 630	20	9.81 279	28	0.18 721	9.92 351	8	59	
2	9.73 650	19	9.81 307	28	0.18 693	9.92 343	8	58	
3	9.73 669	20	9.81 335	27	0.18 665	9.92 335	9	57	28 27
4	9.73 689	19	9.81 362	28	0.18 638	9.92 326	8	56	
5	9.73 708	19	9.81 390	28	0.18 610	9.92 318	8	55	I 2.8 2.7
6	9.73 727	20	9.81 418	27	0.18 582	9.92 310	8	54	2 5.6 5.4
7	9.73 747	19	9.81 445	28	0.18 555	9.92 302	8	53	3 8.4 8.1
8	9.73 766	19	9.81 473	27	0.18 527	9.92 293	8	52	4 11.2 10.8
9	9.73 785	20	9.81 500	28	0.18 500	9.92 285	8	51	5 14.0 13.5
10	9.73 805	19	9.81 528	28	0.18 472	9.92 277	8	50	6 16.8 16.2
11	9.73 824	19	9.81 556	27	0.18 444	9.92 269	9	49	7 19.6 18.9
12	9.73 843	20	9.81 583	28	0.18 417	9.92 260	8	48	8 22.4 21.6
13	9.73 863	19	9.81 611	27	0.18 389	9.92 252	8	47	9 25.2 24.3
14	9.73 882	19	9.81 638	28	0.18 362	9.92 244	9	46	
15	9.73 901	20	9.81 666	27	0.18 334	9.92 235	8	45	20 19 18
16	9.73 921	19	9.81 693	28	0.18 307	9.92 227	8	44	
17	9.73 940	19	9.81 721	27	0.18 279	9.92 219	8	43	I 2.0 1.9 1.8
18	9.73 959	19	9.81 748	28	0.18 252	9.92 211	9	42	2 4.0 3.8 3.6
19	9.73 978	20	9.81 776	27	0.18 224	9.92 202	8	41	3 6.0 5.7 5.4
20	9.73 997	19	9.81 803	28	0.18 197	9.92 194	8	40	4 8.0 7.6 7.2
21	9.74 017	19	9.81 831	27	0.18 169	9.92 186	9	39	5 10.0 9.5 9.0
22	9.74 036	20	9.81 858	28	0.18 142	9.92 177	8	38	6 12.0 11.4 10.8
23	9.74 055	19	9.81 886	27	0.18 114	9.92 169	8	37	7 14.0 13.3 12.6
24	9.74 074	19	9.81 913	28	0.18 087	9.92 161	9	36	8 16.0 15.2 14.4
25	9.74 093	20	9.81 941	27	0.18 059	9.92 152	8	35	9 18.0 17.1 16.2
26	9.74 113	19	9.81 968	28	0.18 032	9.92 144	8	34	
27	9.74 132	19	9.81 996	27	0.18 004	9.92 136	9	33	
28	9.74 151	20	9.82 023	28	0.17 977	9.92 127	8	32	
29	9.74 170	19	9.82 051	27	0.17 949	9.92 119	8	31	
30	9.74 189	19	9.82 078	28	0.17 922	9.92 111	9	30	9 8
31	9.74 208	20	9.82 106	27	0.17 894	9.92 102	8	29	I 0.9 0.8
32	9.74 227	19	9.82 133	28	0.17 867	9.92 094	8	28	2 1.8 1.6
33	9.74 246	19	9.82 161	27	0.17 839	9.92 086	8	27	3 2.7 2.4
34	9.74 265	20	9.82 188	28	0.17 812	9.92 077	9	26	4 3.6 3.2
35	9.74 284	19	9.82 215	27	0.17 785	9.92 069	8	25	5 4.5 4.0
36	9.74 303	19	9.82 243	28	0.17 757	9.92 060	9	24	6 5.4 4.8
37	9.74 322	20	9.82 270	27	0.17 730	9.92 052	8	23	7 6.3 5.6
38	9.74 341	19	9.82 298	28	0.17 702	9.92 044	8	22	8 7.2 6.4
39	9.74 360	19	9.82 325	27	0.17 675	9.92 035	9	21	9 8.1 7.2
40	9.74 379	20	9.82 352	28	0.17 648	9.92 027	8	20	
41	9.74 398	19	9.82 380	27	0.17 620	9.92 018	9	19	
42	9.74 417	19	9.82 407	28	0.17 593	9.92 010	8	18	
43	9.74 436	20	9.82 435	27	0.17 565	9.92 002	8	17	
44	9.74 455	19	9.82 462	28	0.17 538	9.91 993	9	16	
45	9.74 474	19	9.82 489	27	0.17 511	9.91 985	8	15	
46	9.74 493	20	9.82 517	28	0.17 483	9.91 976	9	14	
47	9.74 512	19	9.82 544	27	0.17 456	9.91 968	8	13	9 9 8
48	9.74 531	18	9.82 571	28	0.17 429	9.91 959	9	12	28 27 27
49	9.74 549	19	9.82 599	27	0.17 401	9.91 951	9	11	
50	9.74 568	20	9.82 626	28	0.17 374	9.91 942	8	10	
51	9.74 587	19	9.82 653	27	0.17 347	9.91 934	9	9	
52	9.74 606	19	9.82 681	28	0.17 319	9.91 925	8	8	
53	9.74 625	20	9.82 708	27	0.17 292	9.91 917	9	7	
54	9.74 644	18	9.82 735	28	0.17 265	9.91 908	8	6	
55	9.74 662	19	9.82 762	27	0.17 238	9.91 900	9	5	
56	9.74 681	19	9.82 790	28	0.17 210	9.91 891	8	4	
57	9.74 700	20	9.82 817	27	0.17 183	9.91 883	9	3	
58	9.74 719	18	9.82 844	28	0.17 156	9.91 874	8	2	
59	9.74 737	19	9.82 871	27	0.17 129	9.91 866	9	1	
60	9.74 756	20	9.82 899	28	0.17 101	9.91 857	8	0	
'	L. Cos.	d.	L. Cot.	c. d.	L. Tan.	L. Sin.	d.		P. P.



'	L. Sin.	d.	L. Tan.	c. d.	L. Cot.	L. Cos.	d.		P. P.
0	9.74 756	19	9.82 899	27	0.17 101	9.91 857	8	60	
1	9.74 775	19	9.82 926	27	0.17 074	9.91 849	9	59	
2	9.74 794	18	9.82 953	27	0.17 047	9.91 840	8	58	
3	9.74 812	19	9.82 980	28	0.17 020	9.91 832	9	57	
4	9.74 831	19	9.83 008	27	0.16 992	9.91 823	8	56	28 27 26
5	9.74 850	18	9.83 035	27	0.16 965	9.91 815	9	55	1 2.8 2.7 2.6
6	9.74 868	19	9.83 062	27	0.16 938	9.91 806	8	54	2 5.6 5.4 5.2
7	9.74 887	19	9.83 089	28	0.16 911	9.91 798	9	53	3 8.4 8.1 7.8
8	9.74 906	18	9.83 117	27	0.16 883	9.91 789	8	52	4 11.2 10.8 10.4
9	9.74 924	19	9.83 144	27	0.16 856	9.91 781	9	51	5 14.0 13.5 13.0
10	9.74 943	18	9.83 171	27	0.16 829	9.91 772	8	50	6 16.8 16.2 15.6
11	9.74 961	19	9.83 198	27	0.16 802	9.91 763	9	49	7 19.6 18.9 18.2
12	9.74 980	19	9.83 225	27	0.16 775	9.91 755	8	48	8 22.4 21.6 20.8
13	9.74 999	18	9.83 252	28	0.16 748	9.91 746	9	47	9 25.2 24.3 23.4
14	9.75 017	19	9.83 280	27	0.16 720	9.91 738	8	46	
15	9.75 036	18	9.83 307	27	0.16 693	9.91 729	9	45	
16	9.75 054	19	9.83 334	27	0.16 666	9.91 720	8	44	
17	9.75 073	18	9.83 361	27	0.16 639	9.91 712	9	43	19 18
18	9.75 091	19	9.83 388	27	0.16 612	9.91 703	8	42	1 1.9 1.8
19	9.75 110	18	9.83 415	27	0.16 585	9.91 695	9	41	2 3.8 3.6
20	9.75 128	19	9.83 442	28	0.16 558	9.91 686	8	40	3 5.7 5.4
21	9.75 147	18	9.83 470	27	0.16 530	9.91 677	9	39	4 7.6 7.2
22	9.75 165	19	9.83 497	27	0.16 503	9.91 669	8	38	5 9.5 9.0
23	9.75 184	18	9.83 524	27	0.16 476	9.91 660	9	37	6 11.4 10.8
24	9.75 202	19	9.83 551	27	0.16 449	9.91 651	8	36	7 13.3 12.6
25	9.75 221	18	9.83 578	27	0.16 422	9.91 643	9	35	8 15.2 14.4
26	9.75 239	19	9.83 605	27	0.16 395	9.91 634	8	34	9 17.1 16.2
27	9.75 258	18	9.83 632	27	0.16 368	9.91 625	9	33	
28	9.75 276	19	9.83 659	27	0.16 341	9.91 617	8	32	
29	9.75 294	18	9.83 686	27	0.16 314	9.91 608	9	31	
30	9.75 313	19	9.83 713	27	0.16 287	9.91 599	8	30	9 8
31	9.75 331	18	9.83 740	27	0.16 260	9.91 591	9	29	1 0.9 0.8
32	9.75 350	19	9.83 768	28	0.16 232	9.91 582	8	28	2 1.8 1.6
33	9.75 368	18	9.83 795	27	0.16 205	9.91 573	9	27	3 2.7 2.4
34	9.75 386	19	9.83 822	27	0.16 178	9.91 565	8	26	4 3.6 3.2
35	9.75 405	18	9.83 849	27	0.16 151	9.91 556	9	25	5 4.5 4.0
36	9.75 423	19	9.83 876	27	0.16 124	9.91 547	8	24	6 5.4 4.8
37	9.75 441	18	9.83 903	27	0.16 097	9.91 538	9	23	7 6.3 5.6
38	9.75 459	19	9.83 930	27	0.16 070	9.91 530	8	22	8 7.2 6.4
39	9.75 478	18	9.83 957	27	0.16 043	9.91 521	9	21	9 8.1 7.2
40	9.75 496	19	9.83 984	27	0.16 016	9.91 512	8	20	
41	9.75 514	18	9.84 011	27	0.15 989	9.91 504	9	19	
42	9.75 533	19	9.84 038	27	0.15 962	9.91 495	8	18	
43	9.75 551	18	9.84 065	27	0.15 935	9.91 486	9	17	
44	9.75 569	19	9.84 092	27	0.15 908	9.91 477	8	16	
45	9.75 587	18	9.84 119	27	0.15 881	9.91 469	9	15	
46	9.75 605	19	9.84 146	27	0.15 854	9.91 460	8	14	
47	9.75 624	18	9.84 173	27	0.15 827	9.91 451	9	13	9 8 8
48	9.75 642	19	9.84 200	27	0.15 800	9.91 442	8	12	28 28 27
49	9.75 660	18	9.84 227	27	0.15 773	9.91 433	9	11	0 1.6 1.8 1.7
50	9.75 678	19	9.84 254	26	0.15 746	9.91 425	8	10	1 4.7 5.2 5.1
51	9.75 696	18	9.84 280	27	0.15 720	9.91 416	9	9	2 7.8 8.8 8.4
52	9.75 714	19	9.84 307	27	0.15 693	9.91 407	8	8	3 10.9 12.2 11.8
53	9.75 733	18	9.84 334	27	0.15 666	9.91 398	9	7	4 14.0 15.8 15.2
54	9.75 751	19	9.84 361	27	0.15 639	9.91 389	8	6	5 17.1 19.2 18.6
55	9.75 769	18	9.84 388	27	0.15 612	9.91 381	9	5	6 20.2 22.8 21.9
56	9.75 787	19	9.84 415	27	0.15 585	9.91 372	8	4	7 23.3 26.2 25.3
57	9.75 805	18	9.84 442	27	0.15 558	9.91 363	9	3	8 26.4 — —
58	9.75 823	19	9.84 469	27	0.15 531	9.91 354	8	2	
59	9.75 841	18	9.84 496	27	0.15 504	9.91 345	9	1	
60	9.75 859	19	9.84 523	27	0.15 477	9.91 336	8	0	
	L. Cos.	d.	L. Cot.	c. d.	L. Tan.	L. Sin.	d.	'	P. P.

'	L. Sin.	d.	L. Tan.	c. d.	L. Cot.	L. Cos.	d.		P. P.
0	9.75 859	18	9.84 523	27	0.15 477	9.91 336	8	60	
1	9.75 877	18	9.84 550	26	0.15 450	9.91 328	9	59	27 26
2	9.75 895	18	9.84 576	27	0.15 424	9.91 319	9	58	1 2.7 2.6
3	9.75 913	18	9.84 603	27	0.15 397	9.91 310	9	57	2 5.4 5.2
4	9.75 931	18	9.84 630	27	0.15 370	9.91 301	9	56	3 8.1 7.8
5	9.75 949	18	9.84 657	27	0.15 343	9.91 292	9	55	4 10.8 10.4
6	9.75 967	18	9.84 684	27	0.15 316	9.91 283	9	54	5 13.5 13.0
7	9.75 985	18	9.84 711	27	0.15 289	9.91 274	9	53	6 16.2 15.6
8	9.76 003	18	9.84 738	26	0.15 262	9.91 266	8	52	7 18.9 18.2
9	9.76 021	18	9.84 764	27	0.15 236	9.91 257	9	51	8 21.6 20.8
10	9.76 039	18	9.84 791	27	0.15 209	9.91 248	9	50	9 24.3 23.4
11	9.76 057	18	9.84 818	27	0.15 182	9.91 239	9	49	18 17
12	9.76 075	18	9.84 845	27	0.15 155	9.91 230	9	48	
13	9.76 093	18	9.84 872	27	0.15 128	9.91 221	9	47	1 1.8 1.7
14	9.76 111	18	9.84 899	26	0.15 101	9.91 212	9	46	2 3.6 3.4
15	9.76 129	18	9.84 925	27	0.15 075	9.91 203	9	45	3 5.4 5.1
16	9.76 146	17	9.84 952	27	0.15 048	9.91 194	9	44	4 7.2 6.8
17	9.76 164	18	9.84 979	27	0.15 021	9.91 185	9	43	5 9.0 8.5
18	9.76 182	18	9.85 006	27	0.14 994	9.91 176	9	42	6 10.8 10.2
19	9.76 200	18	9.85 033	26	0.14 967	9.91 167	9	41	7 12.6 11.9
20	9.76 218	18	9.85 059	27	0.14 941	9.91 158	9	40	8 14.4 13.6
21	9.76 236	17	9.85 086	27	0.14 914	9.91 149	8	39	9 16.2 15.3
22	9.76 253	18	9.85 113	27	0.14 887	9.91 141	9	38	10 9 8
23	9.76 271	18	9.85 140	26	0.14 860	9.91 132	9	37	1 1.0 0.9 0.8
24	9.76 289	18	9.85 166	27	0.14 834	9.91 123	9	36	2 2.0 1.8 1.6
25	9.76 307	17	9.85 193	27	0.14 807	9.91 114	9	35	3 3.0 2.7 2.4
26	9.76 324	18	9.85 220	27	0.14 780	9.91 105	9	34	4 4.0 3.6 3.2
27	9.76 342	18	9.85 247	26	0.14 753	9.91 096	9	33	5 5.0 4.5 4.0
28	9.76 360	18	9.85 273	27	0.14 727	9.91 087	9	32	6 6.0 5.4 4.8
29	9.76 378	17	9.85 300	27	0.14 700	9.91 078	9	31	7 7.0 6.3 5.6
30	9.76 395	18	9.85 327	27	0.14 673	9.91 069	9	30	8 8.0 7.2 6.4
31	9.76 413	18	9.85 354	26	0.14 646	9.91 060	9	29	9 9.0 8.1 7.2
32	9.76 431	17	9.85 380	27	0.14 620	9.91 051	9	28	
33	9.76 448	18	9.85 407	27	0.14 593	9.91 042	9	27	
34	9.76 466	18	9.85 434	26	0.14 566	9.91 033	9	26	
35	9.76 484	17	9.85 460	27	0.14 540	9.91 023	10	25	10 10
36	9.76 501	18	9.85 487	27	0.14 513	9.91 014	9	24	27 26
37	9.76 519	18	9.85 514	26	0.14 486	9.91 005	9	23	0 1.4 1.3
38	9.76 537	17	9.85 540	27	0.14 460	9.90 996	9	22	1 4.0 3.9
39	9.76 554	18	9.85 567	27	0.14 433	9.90 987	9	21	2 6.8 6.5
40	9.76 572	18	9.85 594	26	0.14 406	9.90 978	9	20	3 9.4 9.1
41	9.76 590	17	9.85 620	27	0.14 380	9.90 969	9	19	4 12.2 11.7
42	9.76 607	18	9.85 647	27	0.14 353	9.90 960	9	18	5 14.8 14.3
43	9.76 625	17	9.85 674	26	0.14 326	9.90 951	9	17	6 17.6 16.9
44	9.76 642	18	9.85 700	27	0.14 300	9.90 942	9	16	7 20.2 19.5
45	9.76 660	17	9.85 727	27	0.14 273	9.90 933	9	15	8 23.0 22.1
46	9.76 677	18	9.85 754	26	0.14 246	9.90 924	9	14	9 25.6 24.7
47	9.76 695	17	9.85 780	27	0.14 220	9.90 915	9	13	
48	9.76 712	18	9.85 807	27	0.14 193	9.90 906	9	12	
49	9.76 730	17	9.85 834	26	0.14 166	9.90 896	10	11	9 9
50	9.76 747	18	9.85 860	27	0.14 140	9.90 887	9	10	27 26
51	9.76 765	17	9.85 887	26	0.14 113	9.90 878	9	9	0 1.5 1.4
52	9.76 782	18	9.85 913	27	0.14 087	9.90 869	9	8	1 4.5 4.3
53	9.76 800	17	9.85 940	27	0.14 060	9.90 860	9	7	2 7.5 7.2
54	9.76 817	18	9.85 967	26	0.14 033	9.90 851	9	6	3 10.5 10.1
55	9.76 835	17	9.85 993	27	0.14 007	9.90 842	9	5	4 13.5 13.0
56	9.76 852	18	9.86 020	26	0.13 980	9.90 832	10	4	5 16.5 15.9
57	9.76 870	17	9.86 046	27	0.13 954	9.90 823	9	3	6 19.5 18.8
58	9.76 887	18	9.86 073	27	0.13 927	9.90 814	9	2	7 22.5 21.7
59	9.76 904	17	9.86 100	26	0.13 900	9.90 805	9	1	8 25.5 24.6
60	9.76 922	18	9.86 126		0.13 874	9.90 796	9	0	
	L. Cos.	d.	L. Cot.	c. d.	L. Tan.	L. Sin.	d.	'	P. P.

	L. Sin.	d.	L. Tan.	c. d.	L. Cot.	L. Cos.	d.		P. P.
<b>0</b>	9.76 922	17	9.86 126	27	0.13 874	9.90 796	9	<b>60</b>	
1	9.76 939	18	9.86 153	26	0.13 847	9.90 787	10	59	
2	9.76 957	17	9.86 179	27	0.13 821	9.90 777	9	58	
3	9.76 974	17	9.86 206	26	0.13 794	9.90 768	9	57	
4	9.76 991	18	9.86 232	27	0.13 768	9.90 759	9	56	27 26
5	9.77 009	17	9.86 259	26	0.13 741	9.90 750	9	55	I 2.7 2.6
6	9.77 026	17	9.86 285	27	0.13 715	9.90 741	10	54	2 5.4 5.2
7	9.77 043	18	9.86 312	26	0.13 688	9.90 731	9	53	3 8.1 7.8
8	9.77 061	17	9.86 338	27	0.13 662	9.90 722	9	52	4 10.8 10.4
9	9.77 078	17	9.86 365	27	0.13 635	9.90 713	9	51	5 13.5 13.0
<b>10</b>	9.77 095	17	9.86 392	26	0.13 608	9.90 704	10	<b>50</b>	6 16.2 15.6
11	9.77 112	18	9.86 418	27	0.13 582	9.90 694	9	49	7 18.9 18.2
12	9.77 130	17	9.86 445	26	0.13 555	9.90 685	9	48	8 21.6 20.8
13	9.77 147	17	9.86 471	27	0.13 529	9.90 676	9	47	9 24.3 23.4
14	9.77 164	17	9.86 498	26	0.13 502	9.90 667	10	46	
15	9.77 181	18	9.86 524	27	0.13 476	9.90 657	9	45	
16	9.77 199	17	9.86 551	26	0.13 449	9.90 648	9	44	
17	9.77 216	17	9.86 577	26	0.13 423	9.90 639	9	43	18 17 16
18	9.77 233	17	9.86 603	27	0.13 397	9.90 630	10	42	I 1.8 1.7 1.6
19	9.77 250	18	9.86 630	26	0.13 370	9.90 620	9	41	2 3.6 3.4 3.2
<b>20</b>	9.77 268	17	9.86 656	27	0.13 344	9.90 611	9	<b>40</b>	3 5.4 5.1 4.8
21	9.77 285	17	9.86 683	26	0.13 317	9.90 602	10	39	4 7.2 6.8 6.4
22	9.77 302	17	9.86 709	27	0.13 291	9.90 592	9	38	5 9.0 8.5 8.0
23	9.77 319	17	9.86 736	26	0.13 264	9.90 583	9	37	6 10.8 10.2 9.6
24	9.77 336	17	9.86 762	27	0.13 238	9.90 574	9	36	7 12.6 11.9 11.2
25	9.77 353	17	9.86 789	26	0.13 211	9.90 565	10	35	8 14.4 13.6 12.8
26	9.77 370	17	9.86 815	27	0.13 185	9.90 555	9	34	9 16.2 15.3 14.4
27	9.77 387	18	9.86 842	26	0.13 158	9.90 546	9	33	
28	9.77 405	17	9.86 868	26	0.13 132	9.90 537	10	32	
29	9.77 422	17	9.86 894	27	0.13 106	9.90 527	9	31	
<b>30</b>	9.77 439	17	9.86 921	26	0.13 079	9.90 518	9	<b>30</b>	10 9
31	9.77 456	17	9.86 947	27	0.13 053	9.90 509	10	29	I 1.0 0.9
32	9.77 473	17	9.86 974	26	0.13 026	9.90 499	9	28	2 2.0 1.8
33	9.77 490	17	9.87 000	27	0.13 000	9.90 490	10	27	3 3.0 2.7
34	9.77 507	17	9.87 027	26	0.12 973	9.90 480	9	26	4 4.0 3.6
35	9.77 524	17	9.87 053	26	0.12 947	9.90 471	9	25	5 5.0 4.5
36	9.77 541	17	9.87 079	27	0.12 921	9.90 462	10	24	6 6.0 5.4
37	9.77 558	17	9.87 106	26	0.12 894	9.90 452	9	23	7 7.0 6.3
38	9.77 575	17	9.87 132	26	0.12 868	9.90 443	9	22	8 8.0 7.2
39	9.77 592	17	9.87 158	27	0.12 842	9.90 434	10	21	9 9.0 8.1
<b>40</b>	9.77 609	17	9.87 185	26	0.12 815	9.90 424	9	<b>20</b>	
41	9.77 626	17	9.87 211	27	0.12 789	9.90 415	10	19	
42	9.77 643	17	9.87 238	26	0.12 762	9.90 405	9	18	
43	9.77 660	17	9.87 264	26	0.12 736	9.90 396	10	17	
44	9.77 677	17	9.87 290	27	0.12 710	9.90 386	9	16	
45	9.77 694	17	9.87 317	26	0.12 683	9.90 377	9	15	
46	9.77 711	17	9.87 343	26	0.12 657	9.90 368	10	14	9 9
47	9.77 728	16	9.87 369	27	0.12 631	9.90 358	9	13	27 26
48	9.77 744	17	9.87 396	26	0.12 604	9.90 349	10	12	
49	9.77 761	17	9.87 422	26	0.12 578	9.90 339	9	11	
<b>50</b>	9.77 778	17	9.87 448	27	0.12 552	9.90 330	10	<b>10</b>	
51	9.77 795	17	9.87 475	26	0.12 525	9.90 320	9	9	
52	9.77 812	17	9.87 501	26	0.12 499	9.90 311	10	8	
53	9.77 829	17	9.87 527	27	0.12 473	9.90 301	9	7	
54	9.77 846	16	9.87 554	26	0.12 446	9.90 292	9	6	
55	9.77 862	17	9.87 580	26	0.12 420	9.90 282	10	5	
56	9.77 879	17	9.87 606	27	0.12 394	9.90 273	9	4	
57	9.77 896	17	9.87 633	26	0.12 367	9.90 263	9	3	
58	9.77 913	17	9.87 659	26	0.12 341	9.90 254	10	2	
59	9.77 930	16	9.87 685	26	0.12 315	9.90 244	9	1	
<b>60</b>	9.77 946		9.87 711		0.12 289	9.90 235		<b>0</b>	
	L. Cos.	d.	L. Cot.	c. d.	L. Tan.	L. Sin.	d.		P. P.



'	L. Sin.	d.	L. Tan.	c. d.	L. Cot.	L. Cos.	d.		P. P.
0	9.77 946	17	9.87 711	27	0.12 289	9.90 235	10	60	
1	9.77 963	17	9.87 738	26	0.12 262	9.90 225	9	59	
2	9.77 980	17	9.87 764	26	0.12 236	9.90 216	10	58	
3	9.77 997	16	9.87 790	27	0.12 210	9.90 206	9	57	
4	9.78 013	17	9.87 817	26	0.12 183	9.90 197	10	56	27 26
5	9.78 030	17	9.87 843	26	0.12 157	9.90 187	9	55	1 2.7 2.6
6	9.78 047	16	9.87 869	26	0.12 131	9.90 178	10	54	2 5.4 5.2
7	9.78 063	17	9.87 895	26	0.12 105	9.90 168	9	53	3 8.1 7.8
8	9.78 080	17	9.87 922	27	0.12 078	9.90 159	10	52	4 10.8 10.4
9	9.78 097	16	9.87 948	26	0.12 052	9.90 149	10	51	5 13.5 13.0
10	9.78 113	17	9.87 974	26	0.12 026	9.90 139	9	50	6 16.2 15.6
11	9.78 130	17	9.88 000	27	0.12 000	9.90 130	10	49	7 18.9 18.2
12	9.78 147	16	9.88 027	26	0.11 973	9.90 120	9	48	8 21.6 20.8
13	9.78 163	17	9.88 053	26	0.11 947	9.90 111	10	47	9 24.3 23.4
14	9.78 180	17	9.88 079	26	0.11 921	9.90 101	10	46	
15	9.78 197	16	9.88 105	26	0.11 895	9.90 091	9	45	
16	9.78 213	17	9.88 131	26	0.11 869	9.90 082	10	44	
17	9.78 230	16	9.88 158	27	0.11 842	9.90 072	9	43	17 16
18	9.78 246	17	9.88 184	26	0.11 816	9.90 063	10	42	1 1.7 1.6
19	9.78 263	17	9.88 210	26	0.11 790	9.90 053	10	41	2 3.4 3.2
20	9.78 280	16	9.88 236	26	0.11 764	9.90 043	9	40	3 5.1 4.8
21	9.78 296	17	9.88 262	27	0.11 738	9.90 034	10	39	4 6.8 6.4
22	9.78 313	16	9.88 289	26	0.11 711	9.90 024	10	38	5 8.5 8.0
23	9.78 329	17	9.88 315	26	0.11 685	9.90 014	9	37	6 10.2 9.6
24	9.78 346	16	9.88 341	26	0.11 659	9.90 005	10	36	7 11.9 11.2
25	9.78 362	17	9.88 367	26	0.11 633	9.89 995	10	35	8 13.6 12.8
26	9.78 379	16	9.88 393	27	0.11 607	9.89 985	9	34	9 15.3 14.4
27	9.78 395	17	9.88 420	26	0.11 580	9.89 976	10	33	
28	9.78 412	16	9.88 446	26	0.11 554	9.89 966	10	32	
29	9.78 428	17	9.88 472	26	0.11 528	9.89 956	9	31	
30	9.78 445	16	9.88 498	26	0.11 502	9.89 947	10	30	10 9
31	9.78 461	17	9.88 524	26	0.11 476	9.89 937	10	29	1 1.0 0.9
32	9.78 478	16	9.88 550	27	0.11 450	9.89 927	9	28	2 2.0 1.8
33	9.78 494	16	9.88 577	26	0.11 423	9.89 918	10	27	3 3.0 2.7
34	9.78 510	17	9.88 603	26	0.11 397	9.89 908	10	26	4 4.0 3.6
35	9.78 527	16	9.88 629	26	0.11 371	9.89 898	10	25	5 5.0 4.5
36	9.78 543	17	9.88 655	26	0.11 345	9.89 888	10	24	6 6.0 5.4
37	9.78 560	16	9.88 681	26	0.11 319	9.89 879	9	23	7 7.0 6.3
38	9.78 576	16	9.88 707	26	0.11 293	9.89 869	10	22	8 8.0 7.2
39	9.78 592	17	9.88 733	26	0.11 267	9.89 859	10	21	9 9.0 8.1
40	9.78 609	16	9.88 759	27	0.11 241	9.89 849	9	20	
41	9.78 625	17	9.88 786	26	0.11 214	9.89 840	10	19	
42	9.78 642	16	9.88 812	26	0.11 188	9.89 830	10	18	
43	9.78 658	16	9.88 838	26	0.11 162	9.89 820	10	17	
44	9.78 674	17	9.88 864	26	0.11 136	9.89 810	9	16	
45	9.78 691	16	9.88 890	26	0.11 110	9.89 801	10	15	10 10
46	9.78 707	16	9.88 916	26	0.11 084	9.89 791	10	14	27 26
47	9.78 723	16	9.88 942	26	0.11 058	9.89 781	10	13	
48	9.78 739	17	9.88 968	26	0.11 032	9.89 771	10	12	0 1.4 1.3
49	9.78 756	16	9.88 994	26	0.11 006	9.89 761	9	11	1 4.0 3.9
50	9.78 772	16	9.89 020	26	0.10 980	9.89 752	10	10	2 6.8 6.5
51	9.78 788	17	9.89 046	27	0.10 954	9.89 742	10	9	3 9.4 9.1
52	9.78 805	16	9.89 073	26	0.10 927	9.89 732	10	8	4 12.2 11.7
53	9.78 821	16	9.89 099	26	0.10 901	9.89 722	10	7	5 14.8 14.3
54	9.78 837	16	9.89 125	26	0.10 875	9.89 712	10	6	6 17.6 16.9
55	9.78 853	16	9.89 151	26	0.10 849	9.89 702	10	5	7 20.2 19.5
56	9.78 869	17	9.89 177	26	0.10 823	9.89 693	9	4	8 23.0 22.1
57	9.78 886	16	9.89 203	26	0.10 797	9.89 683	10	3	9 25.6 24.7
58	9.78 902	16	9.89 229	26	0.10 771	9.89 673	10	2	10
59	9.78 918	16	9.89 255	26	0.10 745	9.89 663	10	1	
60	9.78 934	16	9.89 281	26	0.10 719	9.89 653	10	0	
	L. Cos.	d.	L. Cot.	c. d.	L. Tan.	L. Sin.	d.	'	P. P.

		L. Sin.	d.	L. Tan.	c. d.	L. Cot.	L. Cos.	d.				P. P.	
0	9.78 934	16	9.89 281	26	0.10 719	9.89 653	10	60					
1	9.78 950	17	9.89 307	26	0.10 693	9.89 643	10	59					
2	9.78 967	16	9.89 333	26	0.10 667	9.89 633	10	58					
3	9.78 983	16	9.89 359	26	0.10 641	9.89 624	9	57	26			25	
4	9.78 999	16	9.89 385	26	0.10 615	9.89 614	10	56					
5	9.79 015	16	9.89 411	26	0.10 589	9.89 604	10	55	I	2.6	2.5		
6	9.79 031	16	9.89 437	26	0.10 563	9.89 594	10	54	2	5.2	5.0		
7	9.79 047	16	9.89 463	26	0.10 537	9.89 584	10	53	3	7.8	7.5		
8	9.79 063	16	9.89 489	26	0.10 511	9.89 574	10	52	4	10.4	10.0		
9	9.79 079	16	9.89 515	26	0.10 485	9.89 564	10	51	5	13.0	12.5		
10	9.79 095	16	9.89 541	26	0.10 459	9.89 554	10	50	6	15.6	15.0		
11	9.79 111	17	9.89 567	26	0.10 433	9.89 544	10	49	7	18.2	17.5		
12	9.79 128	16	9.89 593	26	0.10 407	9.89 534	10	48	8	20.8	20.0		
13	9.79 144	16	9.89 619	26	0.10 381	9.89 524	10	47	9	23.4	22.5		
14	9.79 160	16	9.89 645	26	0.10 355	9.89 514	10	46					
15	9.79 176	16	9.89 671	26	0.10 329	9.89 504	10	45					
16	9.79 192	16	9.89 697	26	0.10 303	9.89 495	9	44					
17	9.79 208	16	9.89 723	26	0.10 277	9.89 485	10	43					
18	9.79 224	16	9.89 749	26	0.10 251	9.89 475	10	42	I	1.7	1.6	1.5	
19	9.79 240	16	9.89 775	26	0.10 225	9.89 465	10	41	2	3.4	3.2	3.0	
20	9.79 256	16	9.89 801	26	0.10 199	9.89 455	10	40	3	5.1	4.8	4.5	
21	9.79 272	16	9.89 827	26	0.10 173	9.89 445	10	39	4	6.8	6.4	6.0	
22	9.79 288	16	9.89 853	26	0.10 147	9.89 435	10	38	5	8.5	8.0	7.5	
23	9.79 304	15	9.89 879	26	0.10 121	9.89 425	10	37	6	10.2	9.6	9.0	
24	9.79 319	16	9.89 905	26	0.10 095	9.89 415	10	36	7	11.9	11.2	10.5	
25	9.79 335	16	9.89 931	26	0.10 069	9.89 405	10	35	8	13.6	12.8	12.0	
26	9.79 351	16	9.89 957	26	0.10 043	9.89 395	10	34	9	15.3	14.4	13.5	
27	9.79 367	16	9.89 983	26	0.10 017	9.89 385	10	33					
28	9.79 383	16	9.90 009	26	0.09 991	9.89 375	11	32					
29	9.79 399	16	9.90 035	26	0.09 965	9.89 364	10	31					
30	9.79 415	16	9.90 061	25	0.09 939	9.89 354	10	30	11 10 9				
31	9.79 431	16	9.90 086	26	0.09 914	9.89 344	10	29	I	1.1	1.0	0.9	
32	9.79 447	16	9.90 112	26	0.09 888	9.89 334	10	28	2	2.2	2.0	1.8	
33	9.79 463	16	9.90 138	26	0.09 862	9.89 324	10	27	3	3.3	3.0	2.7	
34	9.79 478	15	9.90 164	26	0.09 836	9.89 314	10	26	4	4.4	4.0	3.6	
35	9.79 494	16	9.90 190	26	0.09 810	9.89 304	10	25	5	5.5	5.0	4.5	
36	9.79 510	16	9.90 216	26	0.09 784	9.89 294	10	24	6	6.6	6.0	5.4	
37	9.79 526	16	9.90 242	26	0.09 758	9.89 284	10	23	7	7.7	7.0	6.3	
38	9.79 542	16	9.90 268	26	0.09 732	9.89 274	10	22	8	8.8	8.0	7.2	
39	9.79 558	15	9.90 294	26	0.09 706	9.89 264	10	21	9	9.9	9.0	8.1	
40	9.79 573	16	9.90 320	26	0.09 680	9.89 254	10	20					
41	9.79 589	16	9.90 346	25	0.09 654	9.89 244	11	19					
42	9.79 605	16	9.90 371	26	0.09 629	9.89 233	10	18					
43	9.79 621	16	9.90 397	26	0.09 603	9.89 223	10	17					
44	9.79 636	15	9.90 423	26	0.09 577	9.89 213	10	16					
45	9.79 652	16	9.90 449	26	0.09 551	9.89 203	10	15					
46	9.79 668	16	9.90 475	26	0.09 525	9.89 193	10	14					
47	9.79 684	16	9.90 501	26	0.09 499	9.89 183	10	13	10 10 9				
48	9.79 699	15	9.90 527	26	0.09 473	9.89 173	10	12	26 25 26				
49	9.79 715	16	9.90 553	26	0.09 447	9.89 162	11	11	O	1.3	1.2	1.4	
50	9.79 731	15	9.90 578	26	0.09 422	9.89 152	10	10	1	3.9	3.8	4.3	
51	9.79 746	16	9.90 604	26	0.09 396	9.89 142	10	9	2	6.5	6.2	7.2	
52	9.79 762	16	9.90 630	26	0.09 370	9.89 132	10	8	3	9.1	8.8	10.1	
53	9.79 778	16	9.90 656	26	0.09 344	9.89 122	10	7	4	11.7	11.2	13.0	
54	9.79 793	15	9.90 682	26	0.09 318	9.89 112	10	6	5	14.3	13.8	15.9	
55	9.79 809	16	9.90 708	26	0.09 292	9.89 101	11	5	6	16.9	16.2	18.8	
56	9.79 825	15	9.90 734	25	0.09 266	9.89 091	10	4	7	19.5	18.8	21.7	
57	9.79 840	16	9.90 759	26	0.09 241	9.89 081	10	3	8	22.1	21.2	24.6	
58	9.79 856	16	9.90 785	26	0.09 215	9.89 071	10	2	9	24.7	23.8	—	
59	9.79 872	15	9.90 811	26	0.09 189	9.89 060	11	1	10				
60	9.79 887	15	9.90 837	26	0.09 163	9.89 050	10	0					
		L. Cos.	d.	L. Cot.	c. d.	L. Tan.	L. Sin.	d.				P. P.	

	L. Sin.	d.	L. Tan.	c. d.	L. Cot.	L. Cos.	d.		P. P.
<b>0</b>	9.79 887	16	9.90 837	26	0.09 163	9.89 050	10	<b>60</b>	
1	9.79 903	15	9.90 863	26	0.09 137	9.89 040	10	59	
2	9.79 918	16	9.90 889	25	0.09 111	9.89 030	10	58	
3	9.79 934	16	9.90 914	26	0.09 086	9.89 020	10	57	
4	9.79 950	15	9.90 940	26	0.09 060	9.89 009	10	56	<b>26 25</b>
5	9.79 965	16	9.90 966	26	0.09 034	9.88 999	10	55	1 2.6 2.5
6	9.79 981	15	9.90 992	26	0.09 008	9.88 989	10	54	2 5.2 5.0
7	9.79 996	16	9.91 018	26	0.08 982	9.88 978	11	53	3 7.8 7.5
8	9.80 012	15	9.91 043	25	0.08 957	9.88 968	10	52	4 10.4 10.0
9	9.80 027	16	9.91 069	26	0.08 931	9.88 958	10	51	5 13.0 12.5
<b>10</b>	9.80 043	15	9.91 095	26	0.08 905	9.88 948	10	50	6 15.6 15.0
11	9.80 058	16	9.91 121	26	0.08 879	9.88 937	11	49	7 18.2 17.5
12	9.80 074	15	9.91 147	26	0.08 853	9.88 927	10	48	8 20.8 20.0
13	9.80 089	16	9.91 172	26	0.08 828	9.88 917	10	47	9 23.4 22.5
14	9.80 105	15	9.91 198	26	0.08 802	9.88 906	11	46	
15	9.80 120	16	9.91 224	26	0.08 776	9.88 896	10	45	
16	9.80 136	15	9.91 250	26	0.08 750	9.88 886	10	44	<b>16 15</b>
17	9.80 151	16	9.91 276	26	0.08 724	9.88 875	11	43	1 1.6 1.5
18	9.80 166	15	9.91 301	25	0.08 699	9.88 865	10	42	2 3.2 3.0
19	9.80 182	16	9.91 327	26	0.08 673	9.88 855	10	41	3 4.8 4.5
<b>20</b>	9.80 197	15	9.91 353	26	0.08 647	9.88 844	11	40	4 6.4 6.0
21	9.80 213	16	9.91 379	26	0.08 621	9.88 834	10	39	5 8.0 7.5
22	9.80 228	15	9.91 404	26	0.08 596	9.88 824	10	38	6 9.6 9.0
23	9.80 244	16	9.91 430	26	0.08 570	9.88 813	11	37	7 11.2 10.5
24	9.80 259	15	9.91 456	26	0.08 544	9.88 803	10	36	8 12.8 12.0
25	9.80 274	16	9.91 482	26	0.08 518	9.88 793	10	35	9 14.4 13.5
26	9.80 290	15	9.91 507	25	0.08 493	9.88 782	11	34	
27	9.80 305	16	9.91 533	26	0.08 467	9.88 772	10	33	
28	9.80 320	15	9.91 559	26	0.08 441	9.88 761	11	32	<b>11 10</b>
29	9.80 336	16	9.91 585	26	0.08 415	9.88 751	10	31	1 1.1 1.0
<b>30</b>	9.80 351	15	9.91 610	25	0.08 390	9.88 741	10	<b>30</b>	2 2.2 2.0
31	9.80 366	16	9.91 636	26	0.08 364	9.88 730	11	29	3 3.3 3.0
32	9.80 382	15	9.91 662	26	0.08 338	9.88 720	10	28	4 4.4 4.0
33	9.80 397	16	9.91 688	26	0.08 312	9.88 709	11	27	5 5.5 5.0
34	9.80 412	15	9.91 713	25	0.08 287	9.88 699	10	26	6 6.6 6.0
35	9.80 428	16	9.91 739	26	0.08 261	9.88 688	11	25	7 7.7 7.0
36	9.80 443	15	9.91 765	26	0.08 235	9.88 678	10	24	8 8.8 8.0
37	9.80 458	16	9.91 791	26	0.08 209	9.88 668	11	23	9 9.9 9.0
38	9.80 473	15	9.91 816	25	0.08 184	9.88 657	10	22	
39	9.80 489	16	9.91 842	26	0.08 158	9.88 647	11	21	
<b>40</b>	9.80 504	15	9.91 868	25	0.08 132	9.88 636	10	<b>20</b>	
41	9.80 519	16	9.91 893	26	0.08 107	9.88 626	11	19	
42	9.80 534	15	9.91 919	26	0.08 081	9.88 615	10	18	
43	9.80 550	16	9.91 945	26	0.08 055	9.88 605	11	17	
44	9.80 565	15	9.91 971	26	0.08 029	9.88 594	10	16	<b>11 11</b>
45	9.80 580	16	9.91 996	25	0.08 004	9.88 584	11	15	<b>26 25</b>
46	9.80 595	15	9.92 022	26	0.07 978	9.88 573	10	14	0 1.2 1.1
47	9.80 610	16	9.92 048	26	0.07 952	9.88 563	11	13	1 3.5 3.4
48	9.80 625	15	9.92 073	25	0.07 927	9.88 552	10	12	2 5.9 5.7
49	9.80 641	16	9.92 099	26	0.07 901	9.88 542	11	11	3 8.3 8.0
<b>50</b>	9.80 656	15	9.92 125	25	0.07 875	9.88 531	10	<b>10</b>	4 10.6 10.2
51	9.80 671	16	9.92 150	26	0.07 850	9.88 521	11	9	5 13.0 12.5
52	9.80 686	15	9.92 176	26	0.07 824	9.88 510	10	8	6 15.4 14.8
53	9.80 701	16	9.92 202	26	0.07 798	9.88 499	11	7	7 17.7 17.0
54	9.80 716	15	9.92 227	25	0.07 773	9.88 489	10	6	8 20.1 19.3
55	9.80 731	16	9.92 253	26	0.07 747	9.88 478	11	5	9 22.5 21.6
56	9.80 746	15	9.92 279	26	0.07 721	9.88 468	10	4	10 24.8 23.9
57	9.80 762	16	9.92 304	25	0.07 696	9.88 457	11	3	
58	9.80 777	15	9.92 330	26	0.07 670	9.88 447	10	2	
59	9.80 792	16	9.92 356	25	0.07 644	9.88 436	11	1	
<b>60</b>	9.80 807	15	9.92 381	26	0.07 619	9.88 425	10	<b>0</b>	
	L. Cos.	d.	L. Cot.	c. d.	L. Tan.	L. Sin.	d.		P. P.



'	L. Sin.	d.	L. Tan.	c. d.	L. Cot.	L. Cos.	d.		P. P.
0	9.80 807	15	9.92 381	26	0.07 619	9.88 425	10	60	
1	9.80 822	15	9.92 407	26	0.07 593	9.88 415	11	59	
2	9.80 837	15	9.92 433	25	0.07 567	9.88 404	10	58	
3	9.80 852	15	9.92 458	26	0.07 542	9.88 394	11	57	26 25
4	9.80 867	15	9.92 484	26	0.07 516	9.88 383	11	56	1 2.6 2.5
5	9.80 882	15	9.92 510	25	0.07 490	9.88 372	10	55	2 5.2 5.0
6	9.80 897	15	9.92 535	26	0.07 465	9.88 362	11	54	3 7.8 7.5
7	9.80 912	15	9.92 561	26	0.07 439	9.88 351	11	53	4 10.4 10.0
8	9.80 927	15	9.92 587	25	0.07 413	9.88 340	10	52	5 13.0 12.5
9	9.80 942	15	9.92 612	26	0.07 388	9.88 330	11	51	6 15.6 15.0
10	9.80 957	15	9.92 638	25	0.07 362	9.88 319	11	50	7 18.2 17.5
11	9.80 972	15	9.92 663	26	0.07 337	9.88 308	10	49	8 20.8 20.0
12	9.80 987	15	9.92 689	26	0.07 311	9.88 298	11	48	9 23.4 22.5
13	9.81 002	15	9.92 715	25	0.07 285	9.88 287	11	47	
14	9.81 017	15	9.92 740	26	0.07 260	9.88 276	10	46	
15	9.81 032	15	9.92 766	26	0.07 234	9.88 266	11	45	15 14
16	9.81 047	15	9.92 792	26	0.07 208	9.88 255	11	44	
17	9.81 061	14	9.92 817	25	0.07 183	9.88 244	10	43	1 1.5 1.4
18	9.81 076	15	9.92 843	26	0.07 157	9.88 234	11	42	2 3.0 2.8
19	9.81 091	15	9.92 868	25	0.07 132	9.88 223	11	41	3 4.5 4.2
20	9.81 106	15	9.92 894	26	0.07 106	9.88 212	11	40	4 6.0 5.6
21	9.81 121	15	9.92 920	25	0.07 080	9.88 201	10	39	5 7.5 7.0
22	9.81 136	15	9.92 945	26	0.07 055	9.88 191	11	38	6 9.0 8.4
23	9.81 151	15	9.92 971	25	0.07 029	9.88 180	11	37	7 10.5 9.8
24	9.81 166	14	9.92 996	26	0.07 004	9.88 169	11	36	8 12.0 11.2
25	9.81 180	15	9.93 022	26	0.06 978	9.88 158	10	35	9 13.5 12.6
26	9.81 195	15	9.93 048	25	0.06 952	9.88 148	11	34	
27	9.81 210	15	9.93 073	26	0.06 927	9.88 137	11	33	
28	9.81 225	15	9.93 099	25	0.06 901	9.88 126	11	32	11 10
29	9.81 240	14	9.93 124	26	0.06 876	9.88 115	10	31	1 1.1 1.0
30	9.81 254	15	9.93 150	25	0.06 850	9.88 105	11	30	2 2.2 2.0
31	9.81 269	15	9.93 175	26	0.06 825	9.88 094	11	29	3 3.3 3.0
32	9.81 284	15	9.93 201	26	0.06 799	9.88 083	11	28	4 4.4 4.0
33	9.81 299	15	9.93 227	25	0.06 773	9.88 072	11	27	5 5.5 5.0
34	9.81 314	14	9.93 252	26	0.06 748	9.88 061	10	26	6 6.6 6.0
35	9.81 328	15	9.93 278	25	0.06 722	9.88 051	11	25	7 7.7 7.0
36	9.81 343	15	9.93 303	26	0.06 697	9.88 040	11	24	8 8.8 8.0
37	9.81 358	14	9.93 329	25	0.06 671	9.88 029	11	23	9 9.9 9.0
38	9.81 372	15	9.93 354	26	0.06 646	9.88 018	11	22	
39	9.81 387	15	9.93 380	26	0.06 620	9.88 007	11	21	
40	9.81 402	15	9.93 406	25	0.06 594	9.87 996	11	20	
41	9.81 417	14	9.93 431	26	0.06 569	9.87 985	10	19	
42	9.81 431	15	9.93 457	25	0.06 543	9.87 975	11	18	
43	9.81 446	15	9.93 482	26	0.06 518	9.87 964	11	17	
44	9.81 461	14	9.93 508	25	0.06 492	9.87 953	11	16	11 10 10
45	9.81 475	15	9.93 533	26	0.06 467	9.87 942	11	15	26 26 25
46	9.81 490	15	9.93 559	25	0.06 441	9.87 931	11	14	
47	9.81 505	14	9.93 584	26	0.06 416	9.87 920	11	13	0 1.2 1.3 1.2
48	9.81 519	15	9.93 610	26	0.06 390	9.87 909	11	12	1 3.5 3.9 3.8
49	9.81 534	15	9.93 636	26	0.06 364	9.87 898	11	11	2 5.9 6.5 6.2
50	9.81 549	14	9.93 661	25	0.06 339	9.87 887	10	10	3 8.3 9.1 8.8
51	9.81 563	15	9.93 687	25	0.06 313	9.87 877	11	9	4 10.6 11.7 11.2
52	9.81 578	14	9.93 712	26	0.06 288	9.87 866	11	8	5 13.0 14.3 13.8
53	9.81 592	15	9.93 738	25	0.06 262	9.87 855	11	7	6 15.4 16.9 16.2
54	9.81 607	15	9.93 763	25	0.06 237	9.87 844	11	6	7 17.7 19.5 18.8
55	9.81 622	14	9.93 789	25	0.06 211	9.87 833	11	5	8 20.1 22.1 21.2
56	9.81 636	15	9.93 814	26	0.06 186	9.87 822	11	4	9 22.5 24.7 23.8
57	9.81 651	14	9.93 840	25	0.06 160	9.87 811	11	3	10 24.8 — —
58	9.81 665	15	9.93 865	25	0.06 135	9.87 800	11	2	
59	9.81 680	14	9.93 891	26	0.06 109	9.87 789	11	1	
60	9.81 694	15	9.93 916	25	0.06 084	9.87 778	11	0	
	L. Cos.	d.	L. Cot.	c. d.	L. Tan.	L. Sin.	d.	'	P. P.

	L. Sin.	d.	L. Tan.	c. d.	L. Cot.	L. Cos.	d.		P. P.
0	9.81 694	15	9.93 916	26	0.06 084	9.87 778	11	60	
1	9.81 709	14	9.93 942	25	0.06 058	9.87 767	11	59	
2	9.81 723	15	9.93 967	26	0.06 033	9.87 756	11	58	
3	9.81 738	14	9.93 993	25	0.06 007	9.87 745	11	57	26 25
4	9.81 752	15	9.94 018	26	0.05 982	9.87 734	11	56	1 2.6 2.5
5	9.81 767	14	9.94 044	25	0.05 956	9.87 723	11	55	2 5.2 5.0
6	9.81 781	15	9.94 069	26	0.05 931	9.87 712	11	54	3 7.8 7.5
7	9.81 796	14	9.94 095	25	0.05 905	9.87 701	11	53	4 10.4 10.0
8	9.81 810	15	9.94 120	26	0.05 880	9.87 690	11	52	5 13.0 12.5
9	9.81 825	14	9.94 146	25	0.05 854	9.87 679	11	51	6 15.6 15.0
10	9.81 839	15	9.94 171	26	0.05 829	9.87 668	11	50	7 18.2 17.5
11	9.81 854	14	9.94 197	25	0.05 803	9.87 657	11	49	8 20.8 20.0
12	9.81 868	14	9.94 222	26	0.05 778	9.87 646	11	48	9 23.4 22.5
13	9.81 882	15	9.94 248	25	0.05 752	9.87 635	11	47	
14	9.81 897	14	9.94 273	26	0.05 727	9.87 624	11	46	
15	9.81 911	15	9.94 299	25	0.05 701	9.87 613	12	45	15 14
16	9.81 926	14	9.94 324	26	0.05 676	9.87 601	11	44	
17	9.81 940	15	9.94 350	25	0.05 650	9.87 590	11	43	1 1.5 1.4
18	9.81 955	14	9.94 375	26	0.05 625	9.87 579	11	42	2 3.0 2.8
19	9.81 969	14	9.94 401	25	0.05 599	9.87 568	11	41	3 4.5 4.2
20	9.81 983	15	9.94 426	26	0.05 574	9.87 557	11	40	4 6.0 5.6
21	9.81 998	14	9.94 452	25	0.05 548	9.87 546	11	39	5 7.5 7.0
22	9.82 012	14	9.94 477	26	0.05 523	9.87 535	11	38	6 9.0 8.4
23	9.82 026	15	9.94 503	25	0.05 497	9.87 524	11	37	7 10.5 9.8
24	9.82 041	14	9.94 528	26	0.05 472	9.87 513	12	36	8 12.0 11.2
25	9.82 055	14	9.94 554	25	0.05 446	9.87 501	11	35	9 13.5 12.6
26	9.82 069	15	9.94 579	26	0.05 421	9.87 490	11	34	
27	9.82 084	14	9.94 604	25	0.05 396	9.87 479	11	33	
28	9.82 098	14	9.94 630	26	0.05 370	9.87 468	11	32	
29	9.82 112	14	9.94 655	25	0.05 345	9.87 457	11	31	12 11
30	9.82 126	15	9.94 681	26	0.05 319	9.87 446	12	30	
31	9.82 141	14	9.94 706	25	0.05 294	9.87 434	11	29	1 1.2 1.1
32	9.82 155	14	9.94 732	26	0.05 268	9.87 423	11	28	2 2.4 2.2
33	9.82 169	15	9.94 757	25	0.05 243	9.87 412	11	27	3 3.6 3.3
34	9.82 184	14	9.94 783	26	0.05 217	9.87 401	11	26	4 4.8 4.4
35	9.82 198	14	9.94 808	25	0.05 192	9.87 390	11	25	5 6.0 5.5
36	9.82 212	14	9.94 834	26	0.05 166	9.87 378	12	24	6 7.2 6.6
37	9.82 226	14	9.94 859	25	0.05 141	9.87 367	11	23	7 8.4 7.7
38	9.82 240	15	9.94 884	26	0.05 116	9.87 356	11	22	8 9.6 8.8
39	9.82 255	14	9.94 910	25	0.05 090	9.87 345	11	21	9 10.8 9.9
40	9.82 269	14	9.94 935	26	0.05 065	9.87 334	12	20	
41	9.82 283	14	9.94 961	25	0.05 039	9.87 322	11	19	
42	9.82 297	14	9.94 986	26	0.05 014	9.87 311	11	18	
43	9.82 311	15	9.95 012	25	0.04 988	9.87 300	12	17	12 12 11
44	9.82 326	14	9.95 037	26	0.04 963	9.87 288	11	16	26 25 25
45	9.82 340	14	9.95 062	25	0.04 938	9.87 277	11	15	
46	9.82 354	14	9.95 088	26	0.04 912	9.87 266	11	14	
47	9.82 368	14	9.95 113	25	0.04 887	9.87 255	12	13	0 1.1 1.0 1.1
48	9.82 382	14	9.95 139	26	0.04 861	9.87 243	11	12	1 3.2 3.1 3.4
49	9.82 396	14	9.95 164	25	0.04 836	9.87 232	11	11	2 5.4 5.2 5.7
50	9.82 410	14	9.95 190	26	0.04 810	9.87 221	12	10	3 7.6 7.3 8.0
51	9.82 424	15	9.95 215	25	0.04 785	9.87 209	11	9	4 9.8 9.4 10.2
52	9.82 439	14	9.95 240	26	0.04 760	9.87 198	11	8	5 11.9 11.5 12.5
53	9.82 453	14	9.95 266	25	0.04 734	9.87 187	12	7	6 14.1 13.5 14.8
54	9.82 467	14	9.95 291	26	0.04 709	9.87 175	11	6	7 16.2 15.6 17.0
55	9.82 481	14	9.95 317	25	0.04 683	9.87 164	11	5	8 18.4 17.7 19.3
56	9.82 495	14	9.95 342	26	0.04 658	9.87 153	12	4	9 20.6 19.8 21.6
57	9.82 509	14	9.95 368	25	0.04 632	9.87 141	11	3	10 22.8 21.9 23.9
58	9.82 523	14	9.95 393	26	0.04 607	9.87 130	11	2	11 24.9 24.0 —
59	9.82 537	14	9.95 418	25	0.04 582	9.87 119	12	1	
60	9.82 551		9.95 444		0.04 556	9.87 107		0	
	L. Cos.	d.	L. Cot.	c. d.	L. Tan.	L. Sin.	d.		P. P.

'	L. Sin.	d.	L. Tan.	c. d.	L. Cot.	L. Cos.	d.		P. P.
0	9.82 551	I4	9.95 444	25	0.04 556	9.87 107	II	60	
1	9.82 565	I4	9.95 469	26	0.04 531	9.87 096	II	59	
2	9.82 579	I4	9.95 495	25	0.04 505	9.87 085	12	58	
3	9.82 593	I4	9.95 520	25	0.04 480	9.87 073	II	57	26 25
4	9.82 607	I4	9.95 545	26	0.04 455	9.87 062	12	56	
5	9.82 621	I4	9.95 571	25	0.04 429	9.87 050	II	55	I 2.6 2.5
6	9.82 635	I4	9.95 596	25	0.04 404	9.87 039	II	54	2 5.2 5.0
7	9.82 649	I4	9.95 622	25	0.04 378	9.87 028	12	53	3 7.8 7.5
8	9.82 663	I4	9.95 647	25	0.04 353	9.87 016	II	52	4 10.4 10.0
9	9.82 677	I4	9.95 672	26	0.04 328	9.87 005	12	51	5 13.0 12.5
10	9.82 691	I4	9.95 698	25	0.04 302	9.86 993	II	50	6 15.6 15.0
11	9.82 705	I4	9.95 723	25	0.04 277	9.86 982	12	49	7 18.2 17.5
12	9.82 719	I4	9.95 748	26	0.04 252	9.86 970	II	48	8 20.8 20.0
13	9.82 733	I4	9.95 774	25	0.04 226	9.86 959	12	47	9 23.4 22.5
14	9.82 747	I4	9.95 799	26	0.04 201	9.86 947	II	46	
15	9.82 761	I4	9.95 825	25	0.04 175	9.86 936	12	45	14 13
16	9.82 775	I3	9.95 850	25	0.04 150	9.86 924	II	44	
17	9.82 788	I4	9.95 875	26	0.04 125	9.86 913	12	43	I 1.4 1.3
18	9.82 802	I4	9.95 901	25	0.04 099	9.86 902	II	42	2 2.8 2.6
19	9.82 816	I4	9.95 926	26	0.04 074	9.86 890	12	41	3 4.2 3.9
20	9.82 830	I4	9.95 952	25	0.04 048	9.86 879	II	40	4 5.6 5.2
21	9.82 844	I4	9.95 977	25	0.04 023	9.86 867	12	39	5 7.0 6.5
22	9.82 858	I4	9.96 002	26	0.03 998	9.86 855	II	38	6 8.4 7.8
23	9.82 872	I3	9.96 028	25	0.03 972	9.86 844	12	37	7 9.8 9.1
24	9.82 885	I4	9.96 053	25	0.03 947	9.86 832	II	36	8 11.2 10.4
25	9.82 899	I4	9.96 078	26	0.03 922	9.86 821	12	35	9 12.6 11.7
26	9.82 913	I4	9.96 104	25	0.03 896	9.86 809	II	34	
27	9.82 927	I4	9.96 129	26	0.03 871	9.86 798	12	33	12 11
28	9.82 941	I4	9.96 155	25	0.03 845	9.86 786	II	32	
29	9.82 955	I3	9.96 180	25	0.03 820	9.86 775	12	31	I 1.2 1.1
30	9.82 968	I4	9.96 205	26	0.03 795	9.86 763	II	30	2 2.4 2.2
31	9.82 982	I4	9.96 231	25	0.03 769	9.86 752	12	29	3 3.6 3.3
32	9.82 996	I4	9.96 256	25	0.03 744	9.86 740	II	28	4 4.8 4.4
33	9.83 010	I3	9.96 281	26	0.03 719	9.86 728	12	27	5 6.0 5.5
34	9.83 023	I4	9.96 307	25	0.03 693	9.86 717	II	26	6 7.2 6.6
35	9.83 037	I4	9.96 332	25	0.03 668	9.86 705	12	25	7 8.4 7.7
36	9.83 051	I4	9.96 357	26	0.03 643	9.86 694	II	24	8 9.6 8.8
37	9.83 065	I3	9.96 383	25	0.03 617	9.86 682	12	23	9 10.8 9.9
38	9.83 078	I4	9.96 408	25	0.03 592	9.86 670	II	22	
39	9.83 092	I4	9.96 433	26	0.03 567	9.86 659	12	21	
40	9.83 106	I4	9.96 459	25	0.03 541	9.86 647	II	20	
41	9.83 120	I3	9.96 484	26	0.03 516	9.86 635	12	19	
42	9.83 133	I4	9.96 510	25	0.03 490	9.86 624	II	18	
43	9.83 147	I4	9.96 535	25	0.03 465	9.86 612	12	17	12 11 11
44	9.83 161	I3	9.96 560	26	0.03 440	9.86 600	II	16	26 26 25
45	9.83 174	I4	9.96 586	25	0.03 414	9.86 589	12	15	
46	9.83 188	I4	9.96 611	25	0.03 389	9.86 577	II	14	0 1.1 1.2 1.1
47	9.83 202	I3	9.96 636	26	0.03 364	9.86 565	12	13	1 3.2 3.5 3.4
48	9.83 215	I4	9.96 662	25	0.03 338	9.86 554	II	12	2 5.4 5.9 5.7
49	9.83 229	I3	9.96 687	25	0.03 313	9.86 542	12	11	3 7.6 8.3 8.0
50	9.83 242	I4	9.96 712	26	0.03 288	9.86 530	II	10	4 9.8 10.6 10.2
51	9.83 256	I4	9.96 738	25	0.03 262	9.86 518	12	9	5 11.9 13.0 12.5
52	9.83 270	I3	9.96 763	25	0.03 237	9.86 507	II	8	6 14.1 15.4 14.8
53	9.83 283	I4	9.96 788	26	0.03 212	9.86 495	12	7	7 16.2 17.7 17.0
54	9.83 297	I3	9.96 814	25	0.03 186	9.86 483	II	6	8 18.4 20.1 19.3
55	9.83 310	I4	9.96 839	25	0.03 161	9.86 472	12	5	9 20.6 22.5 21.6
56	9.83 324	I4	9.96 864	26	0.03 136	9.86 460	II	4	10 22.8 24.8 23.9
57	9.83 338	I3	9.96 890	25	0.03 110	9.86 448	12	3	11 24.9 — —
58	9.83 351	I4	9.96 915	25	0.03 085	9.86 436	II	2	
59	9.83 365	I3	9.96 940	26	0.03 060	9.86 425	12	1	
60	9.83 378	I4	9.96 966	25	0.03 034	9.86 413	II	0	
	L. Cos.	d.	L. Cot.	c. d.	L. Tan.	L. Sin.	d.	'	P. P.



	L. Sin.	d.	L. Tan.	c. d.	L. Cot.	L. Cos.	d.		P. P.
0	9.83 378	14	9.96 966	25	0.03 034	9.86 413	12	60	
1	9.83 392	13	9.96 991	25	0.03 009	9.86 401	12	59	
2	9.83 405	14	9.97 016	26	0.02 984	9.86 389	12	58	
3	9.83 419	13	9.97 042	25	0.02 958	9.86 377	11	57	26 25
4	9.83 432	14	9.97 067	25	0.02 933	9.86 366	12	56	I 2.6 2.5
5	9.83 446	13	9.97 092	26	0.02 908	9.86 354	12	55	2 5.2 5.0
6	9.83 459	14	9.97 118	25	0.02 882	9.86 342	12	54	3 7.8 7.5
7	9.83 473	13	9.97 143	25	0.02 857	9.86 330	12	53	4 10.4 10.0
8	9.83 486	14	9.97 168	25	0.02 832	9.86 318	12	52	5 13.0 12.5
9	9.83 500	13	9.97 193	25	0.02 807	9.86 306	11	51	6 15.6 15.0
10	9.83 513	14	9.97 219	25	0.02 781	9.86 295	12	50	7 18.2 17.5
11	9.83 527	13	9.97 244	25	0.02 756	9.86 283	12	49	8 20.8 20.0
12	9.83 540	14	9.97 269	26	0.02 731	9.86 271	12	48	9 23.4 22.5
13	9.83 554	13	9.97 295	25	0.02 705	9.86 259	12	47	
14	9.83 567	14	9.97 320	25	0.02 680	9.86 247	12	46	
15	9.83 581	13	9.97 345	26	0.02 655	9.86 235	12	45	14 13
16	9.83 594	14	9.97 371	25	0.02 629	9.86 223	12	44	I 1.4 1.3
17	9.83 608	13	9.97 396	25	0.02 604	9.86 211	11	43	2 2.8 2.6
18	9.83 621	14	9.97 421	26	0.02 579	9.86 200	12	42	3 4.2 3.9
19	9.83 634	13	9.97 447	25	0.02 553	9.86 188	12	41	4 5.6 5.2
20	9.83 648	14	9.97 472	25	0.02 528	9.86 176	12	40	5 7.0 6.5
21	9.83 661	13	9.97 497	26	0.02 503	9.86 164	12	39	6 8.4 7.8
22	9.83 674	14	9.97 523	25	0.02 477	9.86 152	12	38	7 9.8 9.1
23	9.83 688	13	9.97 548	25	0.02 452	9.86 140	12	37	8 11.2 10.4
24	9.83 701	14	9.97 573	25	0.02 427	9.86 128	12	36	9 12.6 11.7
25	9.83 715	13	9.97 598	26	0.02 402	9.86 116	12	35	
26	9.83 728	14	9.97 624	25	0.02 376	9.86 104	12	34	
27	9.83 741	13	9.97 649	25	0.02 351	9.86 092	12	33	12 11
28	9.83 755	14	9.97 674	26	0.02 326	9.86 080	12	32	I 1.2 1.1
29	9.83 768	13	9.97 700	25	0.02 300	9.86 068	12	31	2 2.4 2.2
30	9.83 781	14	9.97 725	25	0.02 275	9.86 056	12	30	3 3.6 3.3
31	9.83 795	13	9.97 750	26	0.02 250	9.86 044	12	29	4 4.8 4.4
32	9.83 808	14	9.97 776	25	0.02 224	9.86 032	12	28	5 6.0 5.5
33	9.83 821	13	9.97 801	25	0.02 199	9.86 020	12	27	6 7.2 6.6
34	9.83 834	14	9.97 826	25	0.02 174	9.86 008	12	26	7 8.4 7.7
35	9.83 848	13	9.97 851	26	0.02 149	9.85 996	12	25	8 9.6 8.8
36	9.83 861	14	9.97 877	25	0.02 123	9.85 984	12	24	9 10.8 9.9
37	9.83 874	13	9.97 902	25	0.02 098	9.85 972	12	23	
38	9.83 887	14	9.97 927	26	0.02 073	9.85 960	12	22	
39	9.83 901	13	9.97 953	25	0.02 047	9.85 948	12	21	
40	9.83 914	14	9.97 978	25	0.02 022	9.85 936	12	20	
41	9.83 927	13	9.98 003	26	0.01 997	9.85 924	12	19	
42	9.83 940	14	9.98 029	25	0.01 971	9.85 912	12	18	13 13 12
43	9.83 954	13	9.98 054	25	0.01 946	9.85 900	12	17	26 25 25
44	9.83 967	14	9.98 079	25	0.01 921	9.85 888	12	16	
45	9.83 980	13	9.98 104	25	0.01 896	9.85 876	12	15	0 1.0 1.0
46	9.83 993	14	9.98 130	26	0.01 870	9.85 864	12	14	I 2 3.0 2.9
47	9.84 006	13	9.98 155	25	0.01 845	9.85 851	13	13	3 5.0 4.8
48	9.84 020	14	9.98 180	25	0.01 820	9.85 839	12	12	4 7.0 6.7
49	9.84 033	13	9.98 206	26	0.01 794	9.85 827	12	11	5 9.0 8.7
50	9.84 046	14	9.98 231	25	0.01 769	9.85 815	12	10	6 11.0 10.6
51	9.84 059	13	9.98 256	25	0.01 744	9.85 803	12	9	7 13.0 12.5
52	9.84 072	14	9.98 281	26	0.01 719	9.85 791	12	8	8 15.0 14.4
53	9.84 085	13	9.98 307	25	0.01 693	9.85 779	12	7	9 17.0 16.3
54	9.84 098	14	9.98 332	25	0.01 668	9.85 766	13	6	10 19.0 18.3
55	9.84 112	13	9.98 357	26	0.01 643	9.85 754	12	5	11 21.0 20.2
56	9.84 125	14	9.98 383	25	0.01 617	9.85 742	12	4	12 23.0 22.1
57	9.84 138	13	9.98 408	25	0.01 592	9.85 730	12	3	13 25.0 24.0
58	9.84 151	14	9.98 433	25	0.01 567	9.85 718	12	2	
59	9.84 164	13	9.98 458	25	0.01 542	9.85 706	12	1	
60	9.84 177	14	9.98 484	26	0.01 516	9.85 693	13	0	
	L. Cos.	d.	L. Cot.	c. d.	L. Tan.	L. Sin.	d.		P. P.

'	L. Sin.	d.	L. Tan.	c. d.	L. Cot.	L. Cos.	d.		P. P.
0	9.84 177	13	9.98 484	25	0.01 516	9.85 693	12	60	
1	9.84 190	13	9.98 509	25	0.01 491	9.85 681	12	59	
2	9.84 203	13	9.98 534	26	0.01 466	9.85 669	12	58	26 25 14
3	9.84 216	13	9.98 560	25	0.01 440	9.85 657	12	57	1 2.6 2.5 1.4
4	9.84 229	13	9.98 585	25	0.01 415	9.85 645	12	56	2 5.2 5.0 2.8
5	9.84 242	13	9.98 610	25	0.01 390	9.85 632	13	55	3 7.8 7.5 4.2
6	9.84 255	14	9.98 635	26	0.01 365	9.85 620	12	54	4 10.4 10.0 5.6
7	9.84 269	13	9.98 661	25	0.01 339	9.85 608	12	53	5 13.0 12.5 7.0
8	9.84 282	13	9.98 686	25	0.01 314	9.85 596	12	52	6 15.6 15.0 8.4
9	9.84 295	13	9.98 711	25	0.01 289	9.85 583	13	51	7 18.2 17.5 9.8
10	9.84 308	13	9.98 737	26	0.01 263	9.85 571	12	50	8 20.8 20.0 11.2
11	9.84 321	13	9.98 762	25	0.01 238	9.85 559	12	49	9 23.4 22.5 12.6
12	9.84 334	13	9.98 787	25	0.01 213	9.85 547	12	48	
13	9.84 347	13	9.98 812	26	0.01 188	9.85 534	13	47	13 12
14	9.84 360	13	9.98 838	25	0.01 162	9.85 522	12	46	1 1.3 1.2
15	9.84 373	12	9.98 863	25	0.01 137	9.85 510	13	45	2 2.6 2.4
16	9.84 385	13	9.98 888	25	0.01 112	9.85 497	12	44	3 3.9 3.6
17	9.84 398	13	9.98 913	26	0.01 087	9.85 485	12	43	4 5.2 4.8
18	9.84 411	13	9.98 939	25	0.01 061	9.85 473	12	42	5 6.5 6.0
19	9.84 424	13	9.98 964	25	0.01 036	9.85 460	13	41	6 7.8 7.2
20	9.84 437	13	9.98 989	26	0.01 011	9.85 448	12	40	7 9.1 8.4
21	9.84 450	13	9.99 015	25	0.00 985	9.85 436	13	39	8 10.4 9.6
22	9.84 463	13	9.99 040	25	0.00 960	9.85 423	12	38	9 11.7 10.8
23	9.84 476	13	9.99 065	25	0.00 935	9.85 411	12	37	
24	9.84 489	13	9.99 090	26	0.00 910	9.85 399	13	36	
25	9.84 502	13	9.99 116	25	0.00 884	9.85 386	12	35	
26	9.84 515	13	9.99 141	25	0.00 859	9.85 374	13	34	
27	9.84 528	12	9.99 166	25	0.00 834	9.85 361	12	33	13 13
28	9.84 540	13	9.99 191	26	0.00 809	9.85 349	12	32	26 25
29	9.84 553	13	9.99 217	25	0.00 783	9.85 337	13	31	
30	9.84 566	13	9.99 242	25	0.00 758	9.85 324	12	30	0 1.0 1.0
31	9.84 579	13	9.99 267	26	0.00 733	9.85 312	13	29	1 3.0 2.9
32	9.84 592	13	9.99 293	25	0.00 707	9.85 299	12	28	2 5.0 4.8
33	9.84 605	13	9.99 318	25	0.00 682	9.85 287	13	27	3 7.0 6.7
34	9.84 618	12	9.99 343	25	0.00 657	9.85 274	12	26	4 9.0 8.7
35	9.84 630	13	9.99 368	26	0.00 632	9.85 262	12	25	5 11.0 10.6
36	9.84 643	13	9.99 394	25	0.00 606	9.85 250	12	24	6 13.0 12.5
37	9.84 656	13	9.99 419	25	0.00 581	9.85 237	13	23	7 15.0 14.4
38	9.84 669	13	9.99 444	25	0.00 556	9.85 225	12	22	8 17.0 16.3
39	9.84 682	12	9.99 469	26	0.00 531	9.85 212	13	21	9 19.0 18.3
40	9.84 694	13	9.99 495	25	0.00 505	9.85 200	12	20	10 21.0 20.2
41	9.84 707	13	9.99 520	25	0.00 480	9.85 187	13	19	11 23.0 22.1
42	9.84 720	13	9.99 545	25	0.00 455	9.85 175	12	18	12 25.0 24.0
43	9.84 733	12	9.99 570	26	0.00 430	9.85 162	13	17	
44	9.84 745	13	9.99 596	25	0.00 404	9.85 150	12	16	
45	9.84 758	13	9.99 621	25	0.00 379	9.85 137	13	15	12 12
46	9.84 771	13	9.99 646	26	0.00 354	9.85 125	12	14	26 25
47	9.84 784	12	9.99 672	25	0.00 328	9.85 112	13	13	0 1.1 1.0
48	9.84 796	13	9.99 697	25	0.00 303	9.85 100	12	12	1 3.2 3.1
49	9.84 809	13	9.99 722	25	0.00 278	9.85 087	13	11	2 5.4 5.2
50	9.84 822	13	9.99 747	26	0.00 253	9.85 074	12	10	3 7.6 7.3
51	9.84 835	12	9.99 773	25	0.00 227	9.85 062	13	9	4 9.8 9.4
52	9.84 847	13	9.99 798	25	0.00 202	9.85 049	12	8	5 11.9 11.5
53	9.84 860	13	9.99 823	25	0.00 177	9.85 037	13	7	6 14.1 13.5
54	9.84 873	12	9.99 848	26	0.00 152	9.85 024	12	6	7 16.2 15.6
55	9.84 885	13	9.99 874	25	0.00 126	9.85 012	13	5	8 18.4 17.7
56	9.84 898	13	9.99 899	25	0.00 101	9.84 999	12	4	9 20.6 19.8
57	9.84 911	12	9.99 924	25	0.00 076	9.84 986	13	3	10 22.8 21.9
58	9.84 923	13	9.99 949	26	0.00 051	9.84 974	12	2	11 24.9 24.0
59	9.84 936	13	9.99 975	25	0.00 025	9.84 961	13	1	
60	9.84 949		0.00 000		0.00 000	9.84 949		0	
	L. Cos.	d.	L. Cot.	c. d.	L. Tan.	L. Sin.	d.	'	P. P.

114.40

## TABLES XVII., XVIII.

NATURAL TRIGONOMETRIC FUNCTIONS.



Angle.	0'	10'	20'	30'	40'	50'	60'	Angle.	Prop. Parts for 1'.
0°	.0000 00	.0029 09	.0058 18	.0087 27	.0116 35	.0145 44	.0174 52	89°	2.9
1	.0174 52	.0203 6	.0232 7	.0261 8	.0290 8	.0319 9	.0349 0	88	2.9
2	.0349 0	.0378 1	.0407 1	.0436 2	.0465 3	.0494 3	.0523 4	87	2.9
3	.0523 4	.0552 4	.0581 4	.0610 5	.0639 5	.0668 5	.0697 6	86	2.9
4	.0697 6	.0726 6	.0755 6	.0784 6	.0813 6	.0842 6	.0871 6	85	2.9
5	.0871 6	.0900 5	.0929 5	.0958 5	.0987 4	.1016 4	.1045 3	84	2.9
6	.1045 3	.1074 2	.1103 1	.1132 0	.1160 9	.1189 8	.1218 7	83	2.9
7	.1218 7	.1247 6	.1276 4	.1305 3	.1334	.1363	.1392	82	2.9
8	.1392	.1421	.1449	.1478	.1507	.1536	.1564	81	2.9
9	.1564	.1593	.1622	.1650	.1679	.1708	.1736	80	2.9
10	.1736	.1765	.1794	.1822	.1851	.1880	.1908	79	2.9
11	.1908	.1937	.1965	.1994	.2022	.2051	.2079	78	2.9
12	.2079	.2108	.2136	.2164	.2193	.2221	.2250	77	2.8
13	.2250	.2278	.2306	.2334	.2363	.2391	.2419	76	2.8
14	.2419	.2447	.2476	.2504	.2532	.2560	.2588	75	2.8
15	.2588	.2616	.2644	.2672	.2700	.2728	.2756	74	2.8
16	.2756	.2784	.2812	.2840	.2868	.2896	.2924	73	2.8
17	.2924	.2952	.2979	.3007	.3035	.3062	.3090	72	2.8
18	.3090	.3118	.3145	.3173	.3201	.3228	.3256	71	2.8
19	.3256	.3283	.3311	.3338	.3365	.3393	.3420	70	2.7
20	.3420	.3448	.3475	.3502	.3529	.3557	.3584	69	2.7
21	.3584	.3611	.3638	.3665	.3692	.3719	.3746	68	2.7
22	.3746	.3773	.3800	.3827	.3854	.3881	.3907	67	2.7
23	.3907	.3934	.3961	.3987	.4014	.4041	.4067	66	2.7
24	.4067	.4094	.4120	.4147	.4173	.4200	.4226	65	2.7
25	.4226	.4253	.4279	.4305	.4331	.4358	.4384	64	2.6
26	.4384	.4410	.4436	.4462	.4488	.4514	.4540	63	2.6
27	.4540	.4566	.4592	.4617	.4643	.4669	.4695	62	2.6
28	.4695	.4720	.4746	.4772	.4797	.4823	.4848	61	2.6
29	.4848	.4874	.4899	.4924	.4950	.4975	.5000	60	2.5
30	.5000	.5025	.5050	.5075	.5100	.5125	.5150	59	2.5
31	.5150	.5175	.5200	.5225	.5250	.5275	.5299	58	2.5
32	.5299	.5324	.5348	.5373	.5398	.5422	.5446	57	2.5
33	.5446	.5471	.5495	.5519	.5544	.5568	.5592	56	2.4
34	.5592	.5616	.5640	.5664	.5688	.5712	.5736	55	2.4
35	.5736	.5760	.5783	.5807	.5831	.5854	.5878	54	2.4
36	.5878	.5901	.5925	.5948	.5972	.5995	.6018	53	2.3
37	.6018	.6041	.6065	.6088	.6111	.6134	.6157	52	2.3
38	.6157	.6180	.6202	.6225	.6248	.6271	.6293	51	2.3
39	.6293	.6316	.6338	.6361	.6383	.6406	.6428	50	2.3
40	.6428	.6450	.6472	.6494	.6517	.6539	.6561	49	2.2
41	.6561	.6583	.6604	.6626	.6648	.6670	.6691	48	2.2
42	.6691	.6713	.6734	.6756	.6777	.6799	.6820	47	2.2
43	.6820	.6841	.6862	.6884	.6905	.6926	.6947	46	2.1
44	.6947	.6967	.6988	.7009	.7030	.7050	.7071	45	2.1
	60'	50'	40'	30'	20'	10'	0'	Angle.	

## Natural Sines.

Angle.	0'	10'	20'	30'	40'	50'	60'	Angle.	Prop. Parts for 1'.
<b>45°</b>	.7071	.7092	.7112	.7133	.7153	.7173	.7193	<b>44°</b>	2.0
46	.7193	.7214	.7234	.7254	.7274	.7294	.7314	43	2.0
47	.7314	.7333	.7353	.7373	.7392	.7412	.7431	42	2.0
48	.7431	.7451	.7470	.7490	.7509	.7528	.7547	41	1.9
49	.7547	.7566	.7585	.7604	.7623	.7642	.7660	40	1.9
<b>50</b>	.7660	.7679	.7698	.7716	.7735	.7753	.7771	<b>39</b>	1.9
51	.7771	.7790	.7808	.7826	.7844	.7862	.7880	38	1.8
52	.7880	.7898	.7916	.7934	.7951	.7969	.7986	37	1.8
53	.7986	.8004	.8021	.8039	.8056	.8073	.8090	36	1.7
54	.8090	.8107	.8124	.8141	.8158	.8175	.8192	35	1.7
<b>55</b>	.8192	.8208	.8225	.8241	.8258	.8274	.8290	<b>34</b>	1.6
56	.8290	.8307	.8323	.8339	.8355	.8371	.8387	33	1.6
57	.8387	.8403	.8418	.8434	.8450	.8465	.8480	32	1.6
58	.8480	.8496	.8511	.8526	.8542	.8557	.8572	31	1.5
59	.8572	.8587	.8601	.8616	.8631	.8646	.8660	30	1.5
<b>60</b>	.8660	.8675	.8689	.8704	.8718	.8732	.8746	<b>29</b>	1.4
61	.8746	.8760	.8774	.8788	.8802	.8816	.8829	28	1.4
62	.8829	.8843	.8857	.8870	.8884	.8897	.8910	27	1.4
63	.8910	.8923	.8936	.8949	.8962	.8975	.8988	26	1.3
64	.8988	.9001	.9013	.9026	.9038	.9051	.9063	25	1.3
<b>65</b>	.9063	.9075	.9088	.9100	.9112	.9124	.9135	<b>24</b>	1.2
66	.9135	.9147	.9159	.9171	.9182	.9194	.9205	23	1.2
67	.9205	.9216	.9228	.9239	.9250	.9261	.9272	22	1.1
68	.9272	.9283	.9293	.9304	.9315	.9325	.9336	21	1.1
69	.9336	.9346	.9356	.9367	.9377	.9387	.9397	20	1.0
<b>70</b>	.9397	.9407	.9417	.9426	.9436	.9446	.9455	<b>19</b>	1.0
71	.9455	.9465	.9474	.9483	.9492	.9502	.9511	18	0.9
72	.9511	.9520	.9528	.9537	.9546	.9555	.9563	17	0.9
73	.9563	.9572	.9580	.9588	.9596	.9605	.9613	16	0.8
74	.9613	.9621	.9628	.9636	.9644	.9652	.9659	15	0.8
<b>75</b>	.9659	.9667	.9674	.9681	.9689	.9696	.9703	<b>14</b>	0.7
76	.9703	.9710	.9717	.9724	.9730	.9737	.9744	13	0.7
77	.9744	.9750	.9757	.9763	.9769	.9775	.9781	12	0.6
78	.9781	.9787	.9793	.9799	.9805	.9811	.9816	11	0.6
79	.9816	.9822	.9827	.9833	.9838	.9843	.9848	10	0.5
<b>80</b>	.9848	.9853	.9858	.9863	.9868	.9872	.9877	<b>9</b>	0.5
81	.9877	.9881	.9886	.9890	.9894	.9899	.9903	8	0.4
82	.9903	.9907	.9911	.9914	.9918	.9922	.9925	7	0.4
83	.9925	.9929	.9932	.9936	.9939	.9942	.9945	6	0.3
84	.9945	.9948	.9951	.9954	.9957	.9959	.9962	5	0.3
<b>85</b>	.9962	.9964	.9967	.9969	.9971	.9974	.9976	<b>4</b>	0.2
86	.9976	.9978	.9980	.9981	.9983	.9985	.9986	3	0.2
87	.9986	.9988	.9989	.9990	.9992	.9993	.9994	2	0.1
88	.9994	.9995	.9996	.9997	.9997	.9998	.9998	1	0.1
89	.9998	.9999	.9999	1.0000	1.0000	1.0000	1.0000	0	0.0
	60'	50'	40'	30'	20'	10'	0'	Angle.	

## Natural Cosines.

## Natural Tangents.

Angle.	0'	10'	20'	30'	40'	50'	60'	Angle.	Prop. Parts for 1'.
0°	.0000 0	.0029 1	.0058 2	.0087 3	.0116 4	.0145 5	.0174 6	89°	2.9
1	.0174 6	.0203 6	.0232 8	.0261 9	.0291 0	.0320 1	.0349 2	88	2.9
2	.0349 2	.0378 3	.0407 5	.0436 6	.0465 8	.0494 9	.0524 1	87	2.9
3	.0524 1	.0553 3	.0582 4	.0611 6	.0640 8	.0670 0	.0699 3	86	2.9
4	.0699 3	.0728 5	.0757 8	.0787 0	.0816 3	.0845 6	.0874 9	85	2.9
5	.0874 9	.0904 2	.0933 5	.0962 9	.0992 3	.1021 6	.1051 0	84	2.9
6	.1051 0	.1080 5	.1109 9	.1139 4	.1168 8	.1198 3	.1227 8	83	2.9
7	.1227 8	.1257 4	.1286 9	.1316 5	.1346	.1376	.1405	82	3.0
8	.1405	.1435	.1465	.1495	.1524	.1554	.1584	81	3.0
9	.1584	.1614	.1644	.1673	.1703	.1733	.1763	80	3.0
10	.1763	.1793	.1823	.1853	.1883	.1914	.1944	79	3.0
11	.1944	.1974	.2004	.2035	.2065	.2095	.2126	78	3.0
12	.2126	.2156	.2186	.2217	.2247	.2278	.2309	77	3.1
13	.2309	.2339	.2370	.2401	.2432	.2462	.2493	76	3.1
14	.2493	.2524	.2555	.2586	.2617	.2648	.2679	75	3.1
15	.2679	.2711	.2742	.2773	.2805	.2836	.2867	74	3.1
16	.2867	.2899	.2931	.2962	.2994	.3026	.3057	73	3.2
17	.3057	.3089	.3121	.3153	.3185	.3217	.3249	72	3.2
18	.3249	.3281	.3314	.3346	.3378	.3411	.3443	71	3.2
19	.3443	.3476	.3508	.3541	.3574	.3607	.3640	70	3.3
20	.3640	.3673	.3706	.3739	.3772	.3805	.3839	69	3.3
21	.3839	.3872	.3906	.3939	.3973	.4006	.4040	68	3.4
22	.4040	.4074	.4108	.4142	.4176	.4210	.4245	67	3.4
23	.4245	.4279	.4314	.4348	.4383	.4417	.4452	66	3.5
24	.4452	.4487	.4522	.4557	.4592	.4628	.4663	65	3.5
25	.4663	.4699	.4734	.4770	.4806	.4841	.4877	64	3.6
26	.4877	.4913	.4950	.4986	.5022	.5059	.5095	63	3.6
27	.5095	.5132	.5169	.5206	.5243	.5280	.5317	62	3.7
28	.5317	.5354	.5392	.5430	.5467	.5505	.5543	61	3.8
29	.5543	.5581	.5619	.5658	.5696	.5735	.5774	60	3.8
30	.5774	.5812	.5851	.5890	.5930	.5969	.6009	59	3.9
31	.6009	.6048	.6088	.6128	.6168	.6208	.6249	58	4.0
32	.6249	.6289	.6330	.6371	.6412	.6453	.6494	57	4.1
33	.6494	.6536	.6577	.6619	.6661	.6703	.6745	56	4.2
34	.6745	.6787	.6830	.6873	.6916	.6959	.7002	55	4.3
35	.7002	.7046	.7089	.7133	.7177	.7221	.7265	54	4.4
36	.7265	.7310	.7355	.7400	.7445	.7490	.7536	53	4.5
37	.7536	.7581	.7627	.7673	.7720	.7766	.7813	52	4.6
38	.7813	.7860	.7907	.7954	.8002	.8050	.8098	51	4.7
39	.8098	.8146	.8195	.8243	.8292	.8342	.8391	50	4.9
40	.8391	.8441	.8491	.8541	.8591	.8642	.8693	49	5.0
41	.8693	.8744	.8796	.8847	.8899	.8952	.9004	48	5.2
42	.9004	.9057	.9110	.9163	.9217	.9271	.9325	47	5.4
43	.9325	.9380	.9435	.9490	.9545	.9601	.9657	46	5.5
44	.9657	.9713	.9770	.9827	.9884	.9942	1.0000	45	5.7
	60'	50'	40'	30'	20'	10'	0'	Angle.	

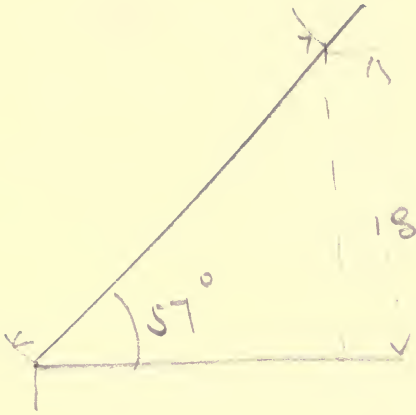
Natural Cotangents.



## Natural Tangents.

Angle.	0'	10'	20'	30'	40'	50'	60'	Angle.	Prop. Parts for 1'.
<b>45°</b>	1.0000	1.0058	1.0117	1.0176	1.0235	1.0295	1.0355	<b>44°</b>	5.9
46	1.0355	1.0416	1.0477	1.0538	1.0599	1.0661	1.0724	43	6.1
47	1.0724	1.0786	1.0850	1.0913	1.0977	1.1041	1.1106	42	6.4
48	1.1106	1.1171	1.1237	1.1303	1.1369	1.1436	1.1504	41	6.6
49	1.1504	1.1571	1.1640	1.1708	1.1778	1.1847	1.1918	40	6.9
<b>50</b>	1.1918	1.1988	1.2059	1.2131	1.2203	1.2276	1.2349	<b>39</b>	7.2
51	1.2349	1.2423	1.2497	1.2572	1.2647	1.2723	1.2799	38	7.5
52	1.2799	1.2876	1.2954	1.3032	1.3111	1.3190	1.3270	37	7.9
53	1.3270	1.3351	1.3432	1.3514	1.3597	1.3680	1.3764	36	8.2
54	1.3764	1.3848	1.3934	1.4019	1.4106	1.4193	1.4281	35	8.6
<b>55</b>	1.4281	1.4370	1.4460	1.4550	1.4641	1.4733	1.4826	<b>34</b>	9.1
56	1.4826	1.4919	1.5013	1.5108	1.5204	1.5301	1.5399	33	9.6
57	1.5399	1.5497	1.5597	1.5697	1.5798	1.5900	1.6003	32	10.1
58	1.6003	1.6107	1.6212	1.6319	1.6426	1.6534	1.6643	31	10.7
59	1.6643	1.6753	1.6864	1.6977	1.7090	1.7205	1.7321	30	11.3
<b>60</b>	1.7321	1.7437	1.7556	1.7675	1.7796	1.7917	1.8040	<b>29</b>	12.0
61	1.8040	1.8165	1.8291	1.8418	1.8546	1.8676	1.8807	28	12.8
62	1.8807	1.8940	1.9074	1.9210	1.9347	1.9486	1.9626	27	13.6
63	1.9626	1.9768	1.9912	2.0057	2.0204	2.0353	2.0503	26	14.6
64	2.0503	2.0655	2.0809	2.0965	2.1123	2.1283	2.1445	25	15.7
<b>65</b>	2.1445	2.1609	2.1775	2.1943	2.2113	2.2286	2.2460	<b>24</b>	16.9
66	2.2460	2.2637	2.2817	2.2998	2.3183	2.3369	2.3559	23	18.3
67	2.3559	2.3750	2.3945	2.4142	2.4342	2.4545	2.4751	22	19.9
68	2.4751	2.4960	2.5172	2.5386	2.5605	2.5826	2.6051	21	21.7
69	2.6051	2.6279	2.6511	2.6746	2.6985	2.7228	2.7475	20	23.7
<b>70</b>	2.7475	2.7725	2.7980	2.8239	2.8502	2.8770	2.9042	<b>19</b>	
71	2.9042	2.9319	2.9600	2.9887	3.0178	3.0475	3.0777	18	
72	3.0777	3.1084	3.1397	3.1716	3.2041	3.2371	3.2709	17	
73	3.2709	3.3052	3.3402	3.3759	3.4124	3.4495	3.4874	16	
74	3.4874	3.5261	3.5656	3.6059	3.6470	3.6891	3.7321	15	
<b>75</b>	3.7321	3.7760	3.8208	3.8667	3.9136	3.9617	4.0108	<b>14</b>	
76	4.0108	4.0611	4.1126	4.1653	4.2193	4.2747	4.3315	13	
77	4.3315	4.3897	4.4494	4.5107	4.5736	4.6382	4.7046	12	
78	4.7046	4.7729	4.8430	4.9152	4.9894	5.0658	5.1446	11	
79	5.1446	5.2257	5.3093	5.3955	5.4845	5.5764	5.6713	10	
<b>80</b>	5.6713	5.7694	5.8708	5.9758	6.0844	6.1970	6.3138	<b>9</b>	
81	6.3138	6.4348	6.5606	6.6912	6.8269	6.9682	7.1154	8	
82	7.1154	7.2687	7.4287	7.5958	7.7704	7.9530	8.1443	7	
83	8.1443	8.3450	8.5555	8.7769	9.0098	9.2553	9.5144	6	
84	9.5144	9.7882	10.0780	10.3854	10.7119	11.0594	11.4301	5	
<b>85</b>	11.4301	11.8262	12.2505	12.7062	13.1969	13.7267	14.3007	<b>4</b>	
86	14.3007	14.9244	15.6048	16.3499	17.1693	18.0750	19.0811	3	
87	19.0811	20.2056	21.4704	22.9038	24.5418	26.4316	28.6363	2	
88	28.6363	31.2416	34.3678	38.1885	42.9641	49.1039	57.2900	1	
89	57.2900	68.7501	85.9398	114.5887	171.8854	343.7737	∞	0	
	60'	50'	40'	30'	20'	10'	0'	Angle.	

## Natural Cotangents.



$$\begin{array}{r}
 25.88 \\
 24.88 \\
 \hline
 20704 \\
 20704 \\
 10352 \\
 5176 \\
 \hline
 6.538944
 \end{array}$$

$$\tan 57^\circ = \frac{18}{x}$$

$$x =$$

$$\frac{18}{\tan 57^\circ}$$

$$\begin{array}{r}
 12 \\
 12 \\
 124 \\
 61 \\
 785
 \end{array}$$

$$\begin{array}{r}
 1.54 \bigg) 180 \\
 \underline{154} \\
 260 \\
 \underline{154} \\
 1060 \\
 \underline{924} \\
 360
 \end{array}$$

$$\begin{array}{r} 50.00 \\ 6.44 \\ \hline \end{array}$$

$$\begin{array}{r} 43.56 \\ \hline \hline \end{array}$$

$$\begin{array}{r} .05824 \\ .06116 \\ \hline \end{array}$$

$$\begin{array}{r} 292 \\ 375 \\ \hline 1460 \\ 2044 \\ 876 \\ \hline \end{array}$$

$$\begin{array}{r} 10952.0 \\ 182.5 \\ \hline \end{array}$$

$$\begin{array}{r} .061160 \\ 182.5 \\ \hline .04333 \end{array}$$

$$0.5933$$

$$\begin{array}{r} 24.88 \\ 75.88 \\ \hline \end{array}$$

$$\begin{array}{r} 19904 \\ 19904 \\ \hline \end{array}$$

$$\begin{array}{r} 12440 \\ 4976 \\ \hline \end{array}$$

$$6.4389$$

$$\begin{array}{r} .05933 \bigg) 90.50000 \quad 1525.3 \\ \underline{5933} \end{array}$$

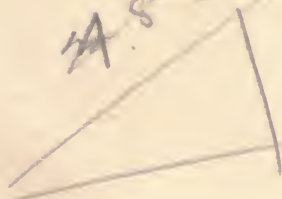
$$\begin{array}{r} 31170 \\ 29665 \\ \hline \end{array}$$

$$\begin{array}{r} 15050 \\ 11866 \\ \hline \end{array}$$

$$\begin{array}{r} 31842 \\ 29665 \\ \hline \end{array}$$

$$21750$$

As







$$\begin{array}{r}
 292 \\
 37.5 \\
 \hline
 1960 \\
 2044 \\
 816 \\
 \hline
 10950.0 \\
 182.5
 \end{array}$$

$$\begin{array}{r}
 .06116 \\
 .1825 \\
 \hline
 .059335 \\
 \hline
 90.5 \\
 \hline
 5
 \end{array}$$

$$\begin{array}{r}
 .05934 \quad ) \quad 90.50000 \quad (1525. \\
 \underline{5934} \\
 31160 \\
 \underline{29670} \\
 14900 \\
 \underline{11868} \\
 30320 \\
 \underline{29670} \\
 6500
 \end{array}$$

$$\begin{array}{r}
 17960 \\
 125 \\
 \hline
 5415
 \end{array}$$

Manning Surveying

Field Notes

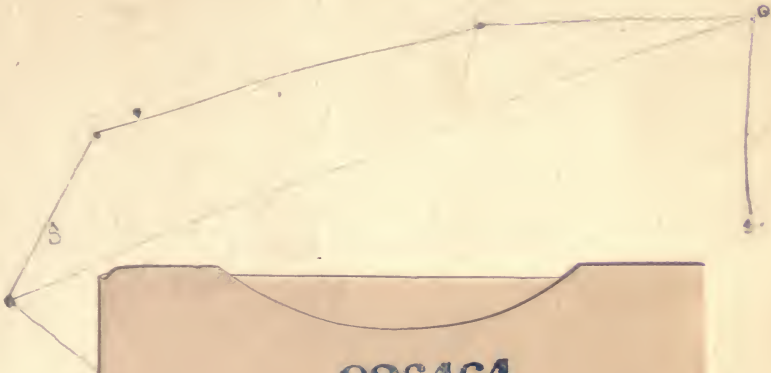
Station	Vertical	Angles	Course	Distance	Run.
	Intermed	Angles			

Office form

Course	Distance	Lat.	N/S.	EW	Dep.	Lat	Long	Dist	Lat	Long	Dist
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